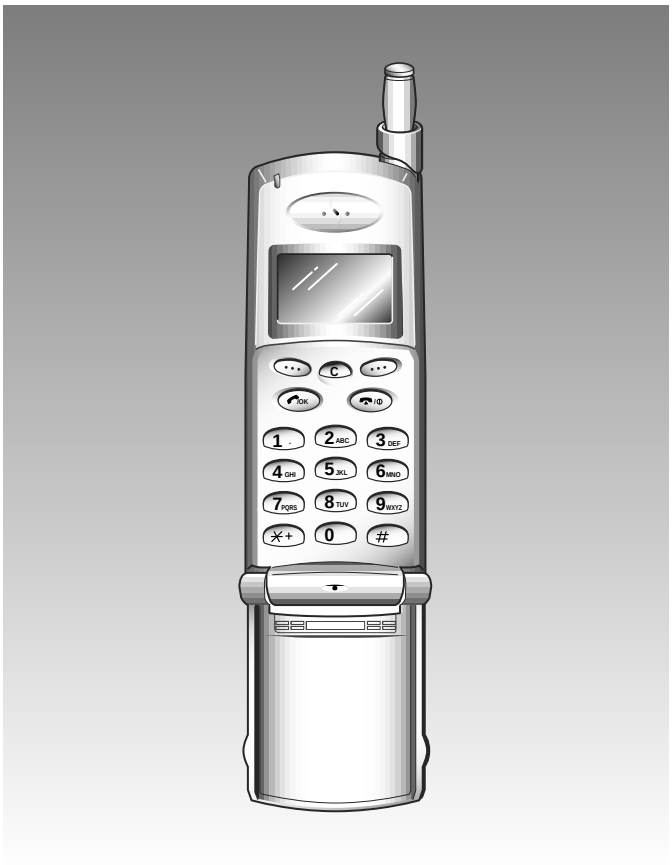
SAMSUNG

GSM Mobile Cellular Phone

SGH-600

SERVICE *Manual*

GSM Mobile Cellular Phone



CONTENTS

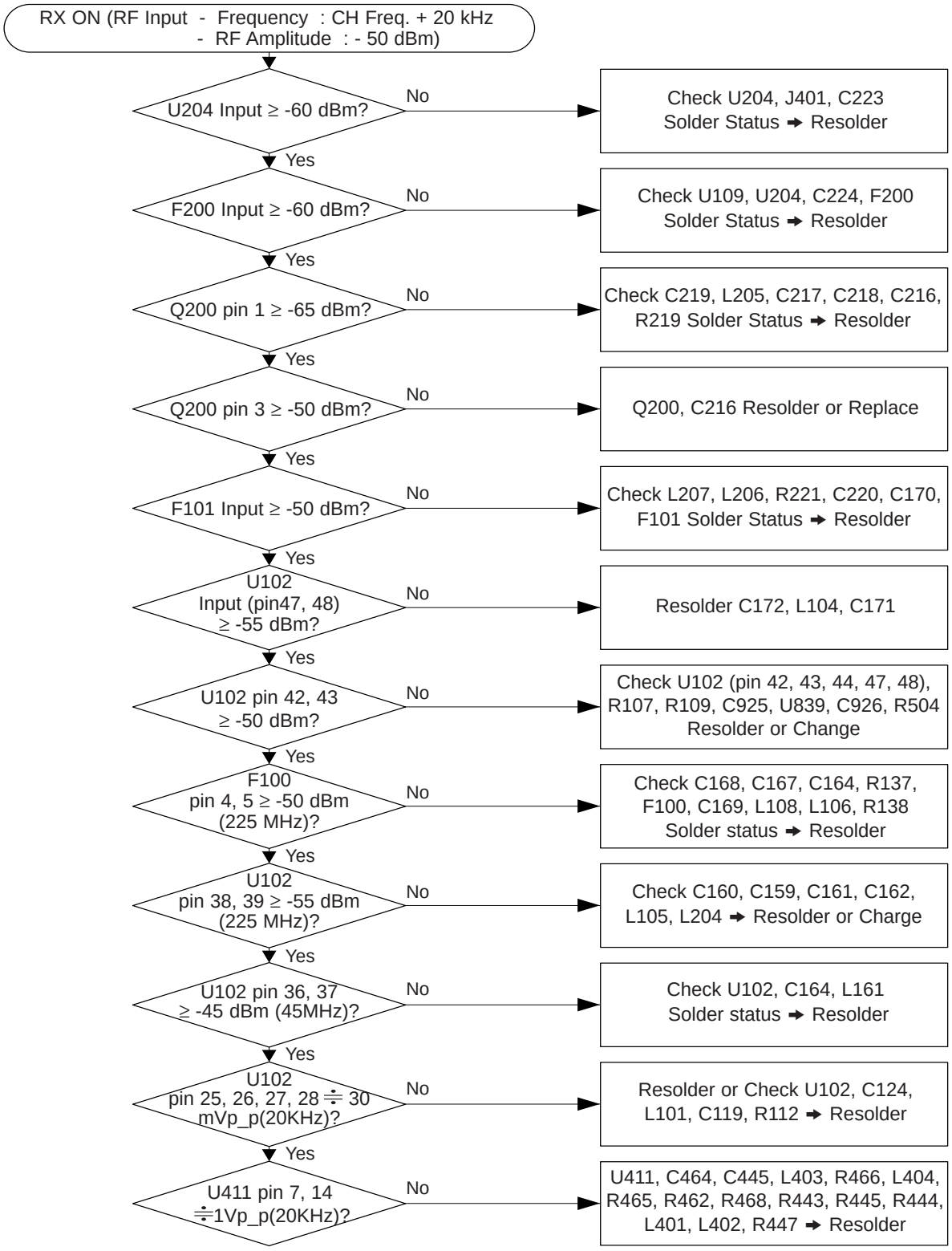
1. General Description
2. Circuit Description
3. Specification
4. Manual Adjustment Test Procedure
5. Troubleshooting
6. PCB Views
7. Electrical Parts List
8. Exploded Views and Parts List
9. Block Diagram
10. Schematic Diagrams

Samsung Electronics Co.,Ltd.

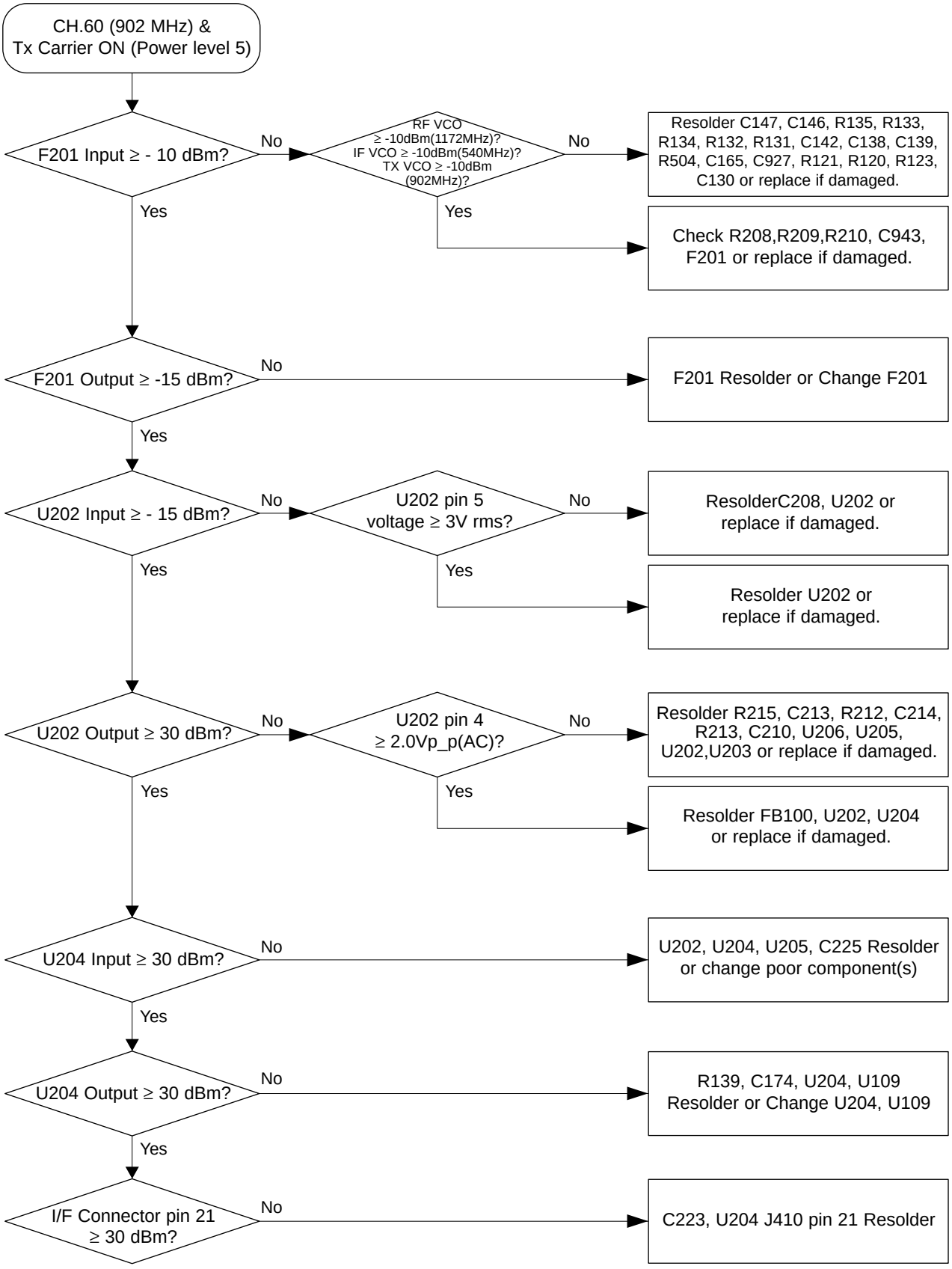
5. Troubleshooting

5-1 Main Set

5-1-1 RX Sensitivity Problem

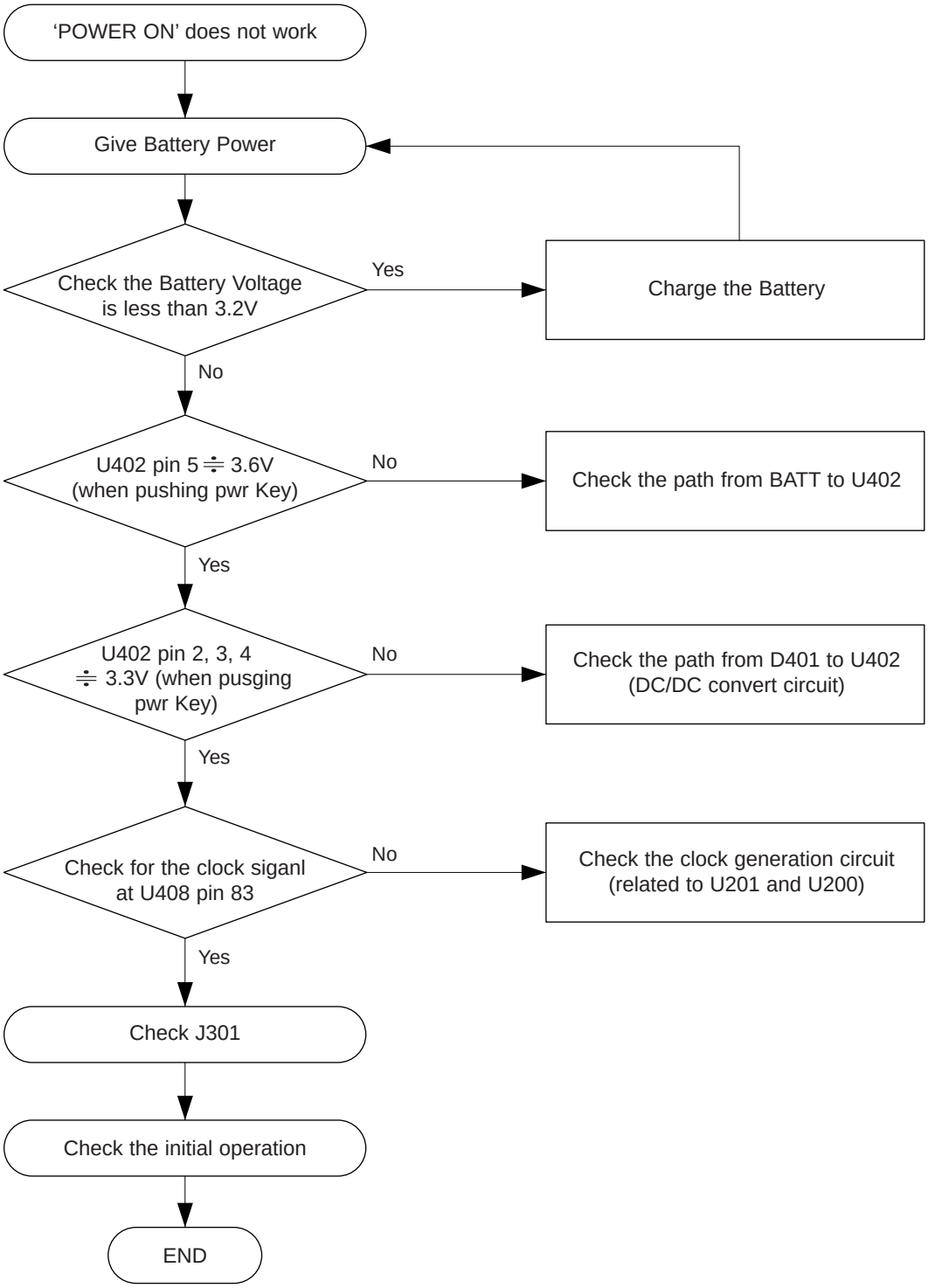


5-1-2 TX Power Problem

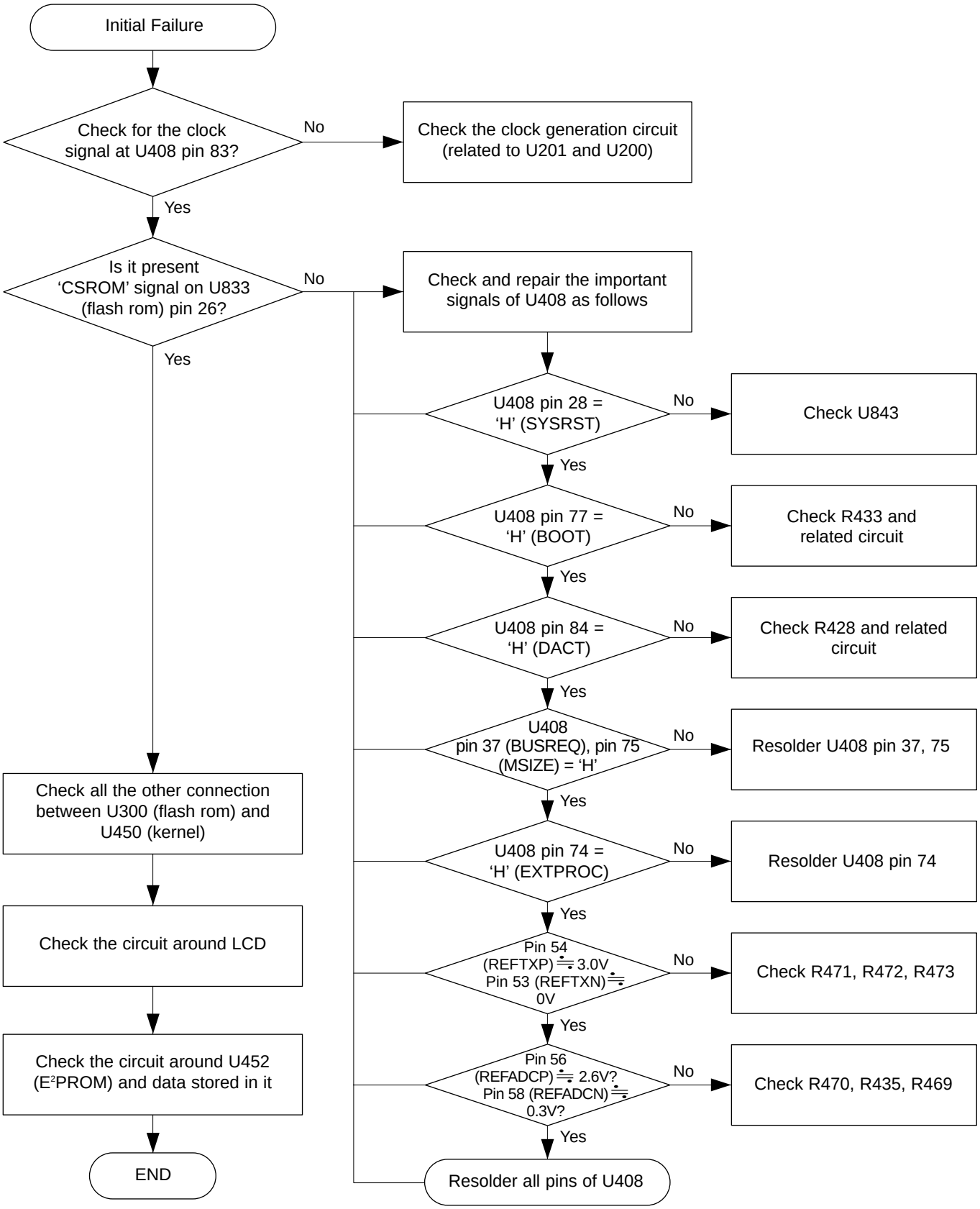


5-1-3 Base Band

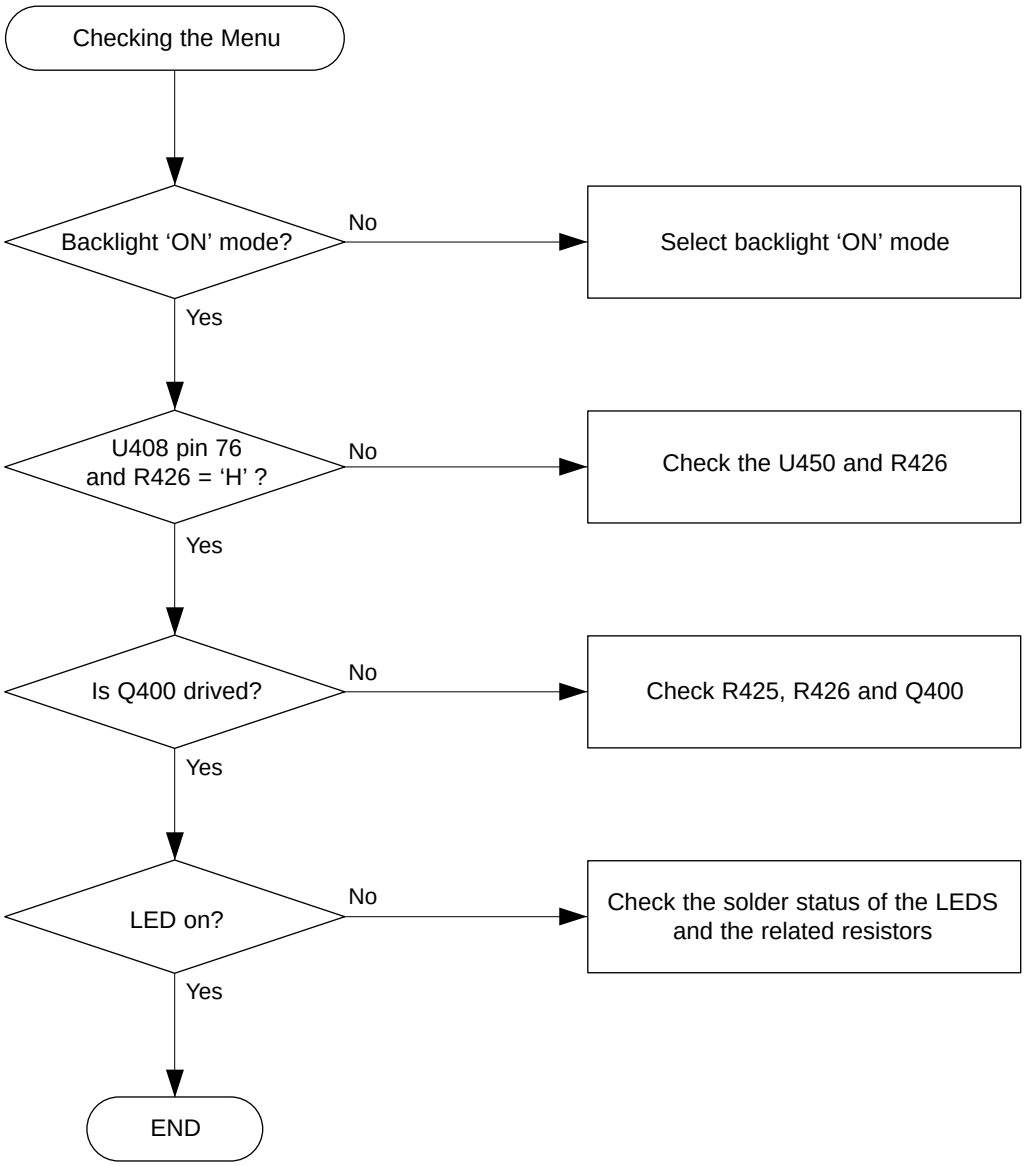
POWER ON


'POWER ON' does not work
Give Battery Power
Check the Battery Voltage is less than 3.2V
Yes
Charge the Battery
No
U402 pin 5 ≒ 3.6V (when pushing pwr Key)
No
Check the path from BATT to U402
Yes
U402 pin 2, 3, 4 ≒ 3.3V (when pusging pwr Key)
No
Check the path from D401 to U402 (DC/DC convert circuit)
Yes
Check for the clock siganl at U408 pin 83
No
Check the clock generation circuit (related to U201 and U200)
Yes
Check J301
Check the initial operation
END

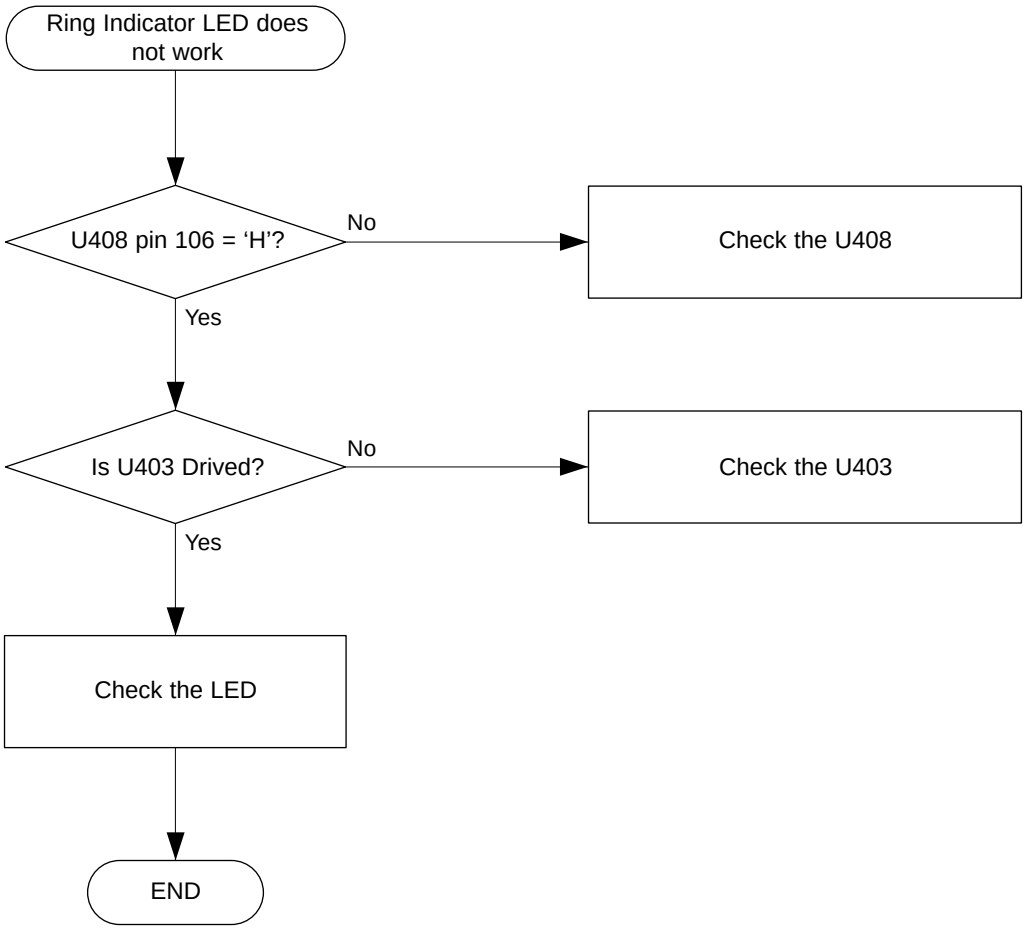
INITIAL OPERATION


Initial Failure
Check for the clock signal at U408 pin 83?
No
Check the clock generation circuit (related to U201 and U200)
Yes
Is it present 'CSROM' signal on U833 (flash rom) pin 26?
No
Check and repair the important signals of U408 as follows
Yes
U408 pin 28 = 'H' (SYSRST)
No
Check U843
Yes
U408 pin 77 = 'H' (BOOT)
No
Check R433 and related circuit
Yes
U408 pin 84 = 'H' (DACT)
No
Check R428 and related circuit
Yes
U408 pin 37 (BUSREQ), pin 75 (MSIZE) = 'H'
No
Resolder U408 pin 37, 75
Yes
U408 pin 74 = 'H' (EXTPROC)
No
Resolder U408 pin 74
Yes
Pin 54 (REFTXP) 3.0V Pin 53 (REFTXN) 0V
No
Check R471, R472, R473
Yes
Pin 56 (REFADCP) 2.6V? Pin 58 (REFADCN) 0.3V?
No
Check R470, R435, R469
Yes
Resolder all pins of U408
Check all the other connection between U300 (flash rom) and U450 (kernel)
Check the circuit around LCD
Check the circuit around U452 (E²PROM) and data stored in it
END

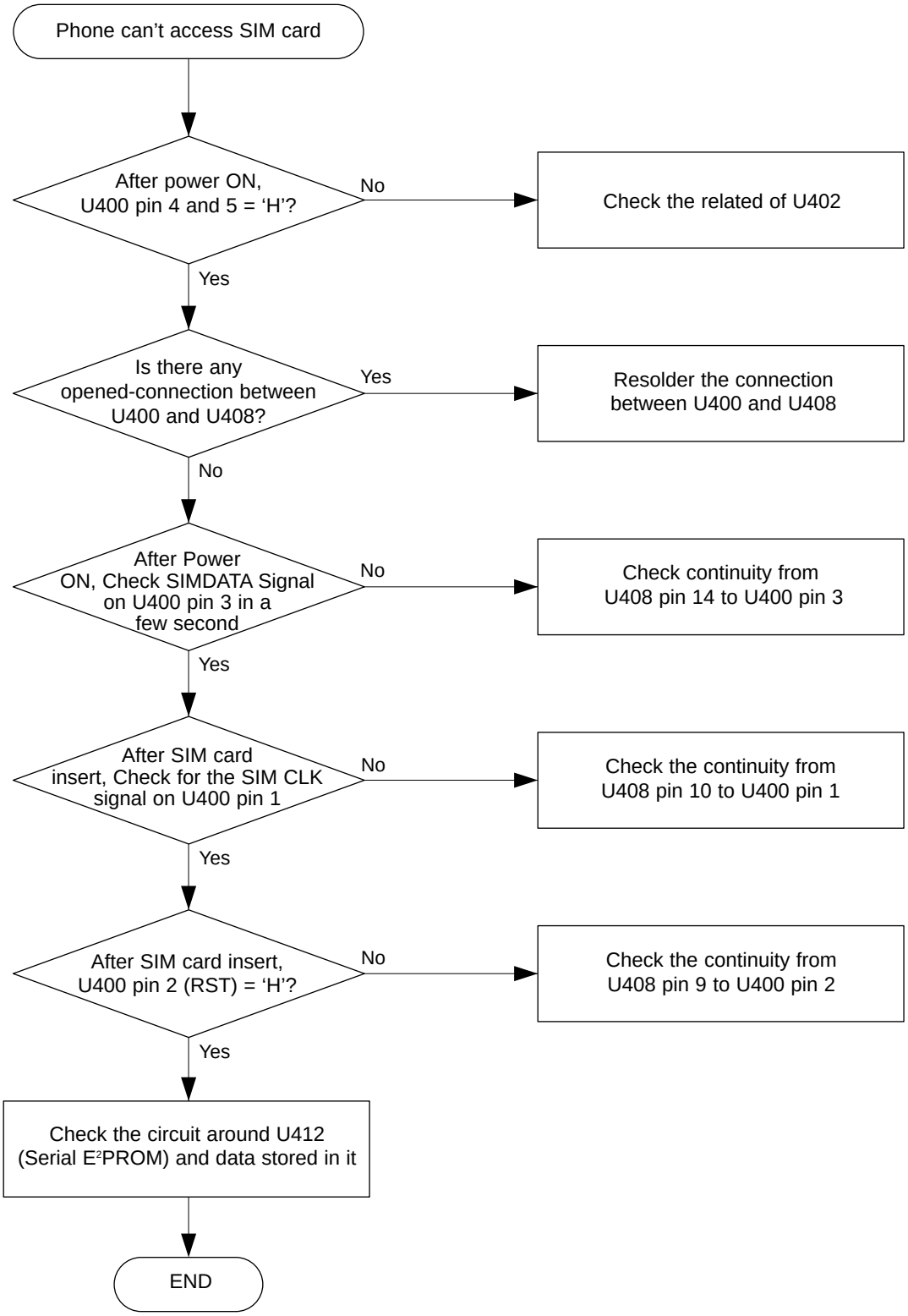
BACKLIGHT


Checking the Menu
Backlight 'ON' mode?
No
Select backlight 'ON' mode
Yes
U408 pin 76
and R426 = 'H' ?
No
Check the U450 and R426
Yes
Is Q400 drived?
No
Check R425, R426 and Q400
Yes
LED on?
No
Check the solder status of the LEDS
and the related resistors
Yes
END

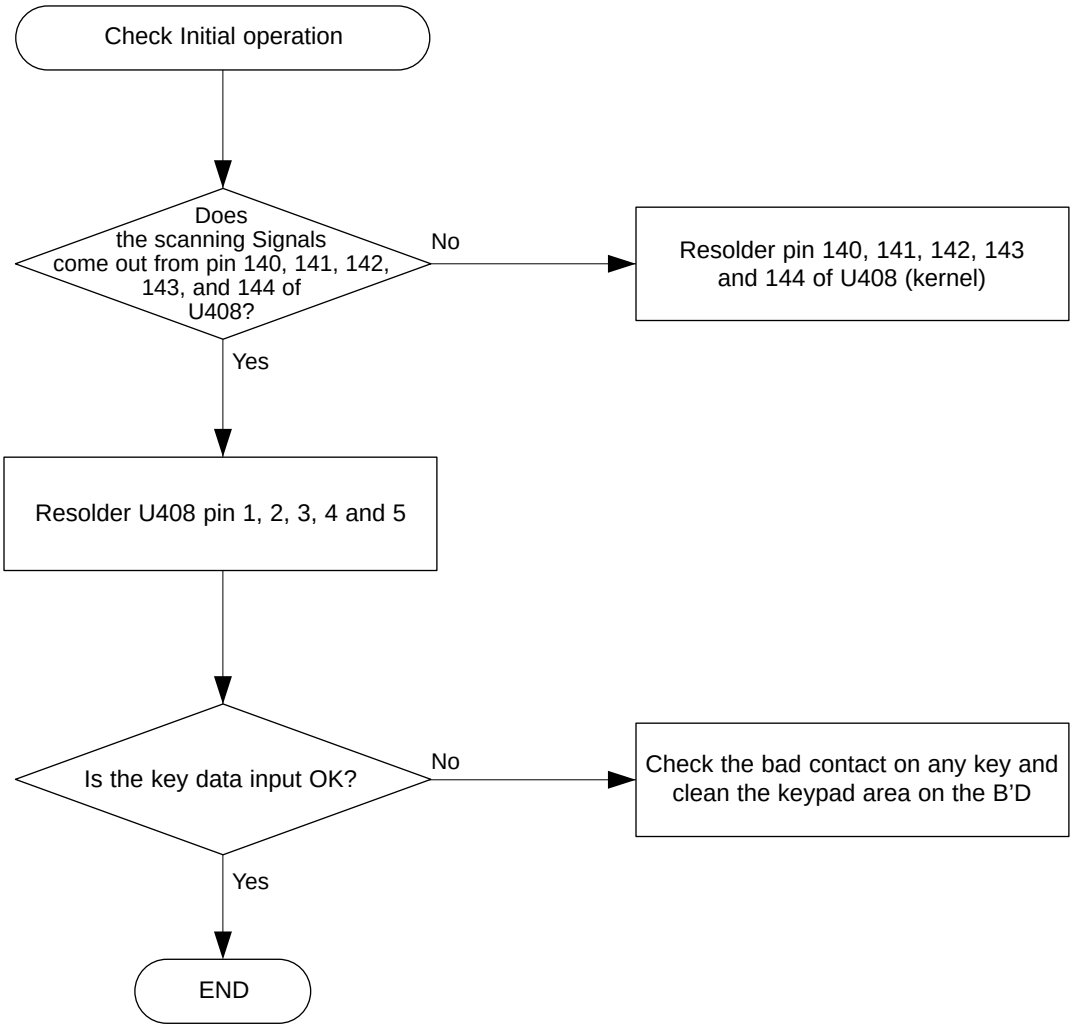
RING INDICATOR LED



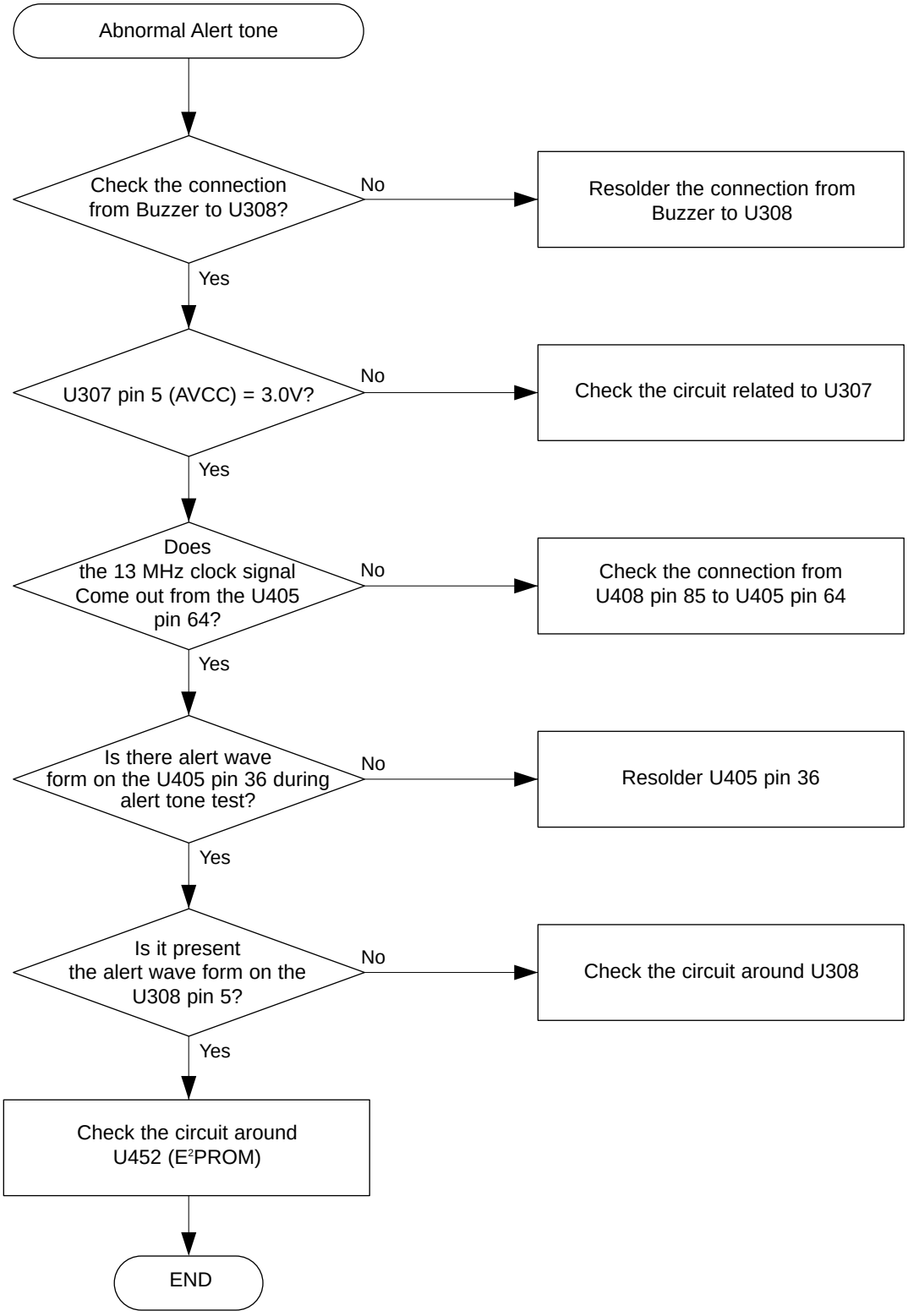
SIM CARD PART


Phone can't access SIM card
After power ON, U400 pin 4 and 5 = 'H'?
No
Check the related of U402
Yes
Is there any opened-connection between U400 and U408?
Yes
Resolder the connection between U400 and U408
No
After Power ON, Check SIMDATA Signal on U400 pin 3 in a few second
No
Check continuity from U408 pin 14 to U400 pin 3
Yes
After SIM card insert, Check for the SIM CLK signal on U400 pin 1
No
Check the continuity from U408 pin 10 to U400 pin 1
Yes
After SIM card insert, U400 pin 2 (RST) = 'H'?
No
Check the continuity from U408 pin 9 to U400 pin 2
Yes
Check the circuit around U412 (Serial E²PROM) and data stored in it
END

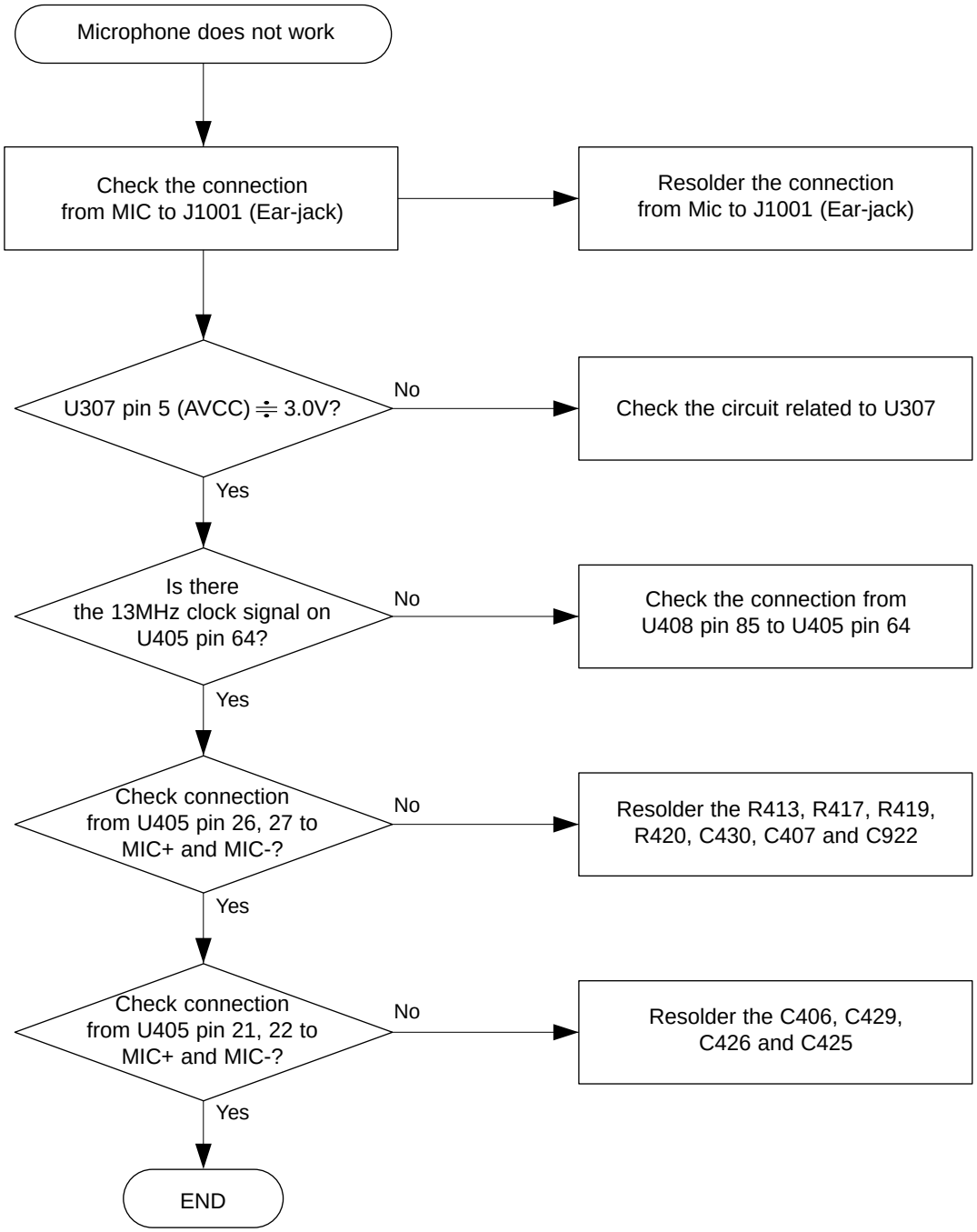
KEY DATA INPUT


Check Initial operation
Does the scanning Signals come out from pin 140, 141, 142, 143, and 144 of U408?
No
Resolder pin 140, 141, 142, 143 and 144 of U408 (kernel)
Yes
Resolder U408 pin 1, 2, 3, 4 and 5
Is the key data input OK?
No
Check the bad contact on any key and clean the keypad area on the B'D
Yes
END

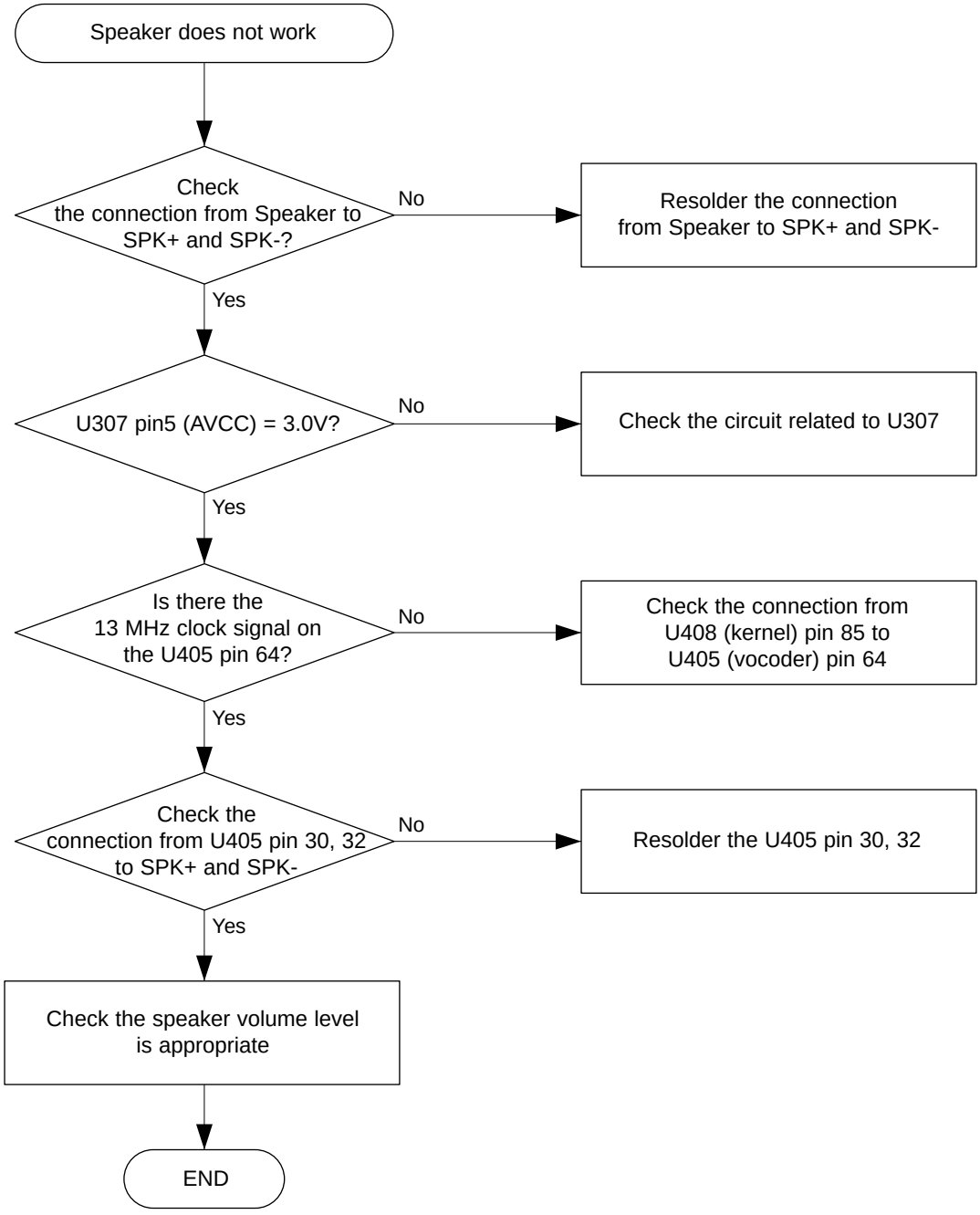
ALERT TONE


Abnormal Alert tone
Check the connection from Buzzer to U308?
No
Resolder the connection from Buzzer to U308
Yes
U307 pin 5 (AVCC) = 3.0V?
No
Check the circuit related to U307
Yes
Does the 13 MHz clock signal Come out from the U405 pin 64?
No
Check the connection from U408 pin 85 to U405 pin 64
Yes
Is there alert wave form on the U405 pin 36 during alert tone test?
No
Resolder U405 pin 36
Yes
Is it present the alert wave form on the U308 pin 5?
No
Check the circuit around U308
Yes
Check the circuit around U452 (E²PROM)
END

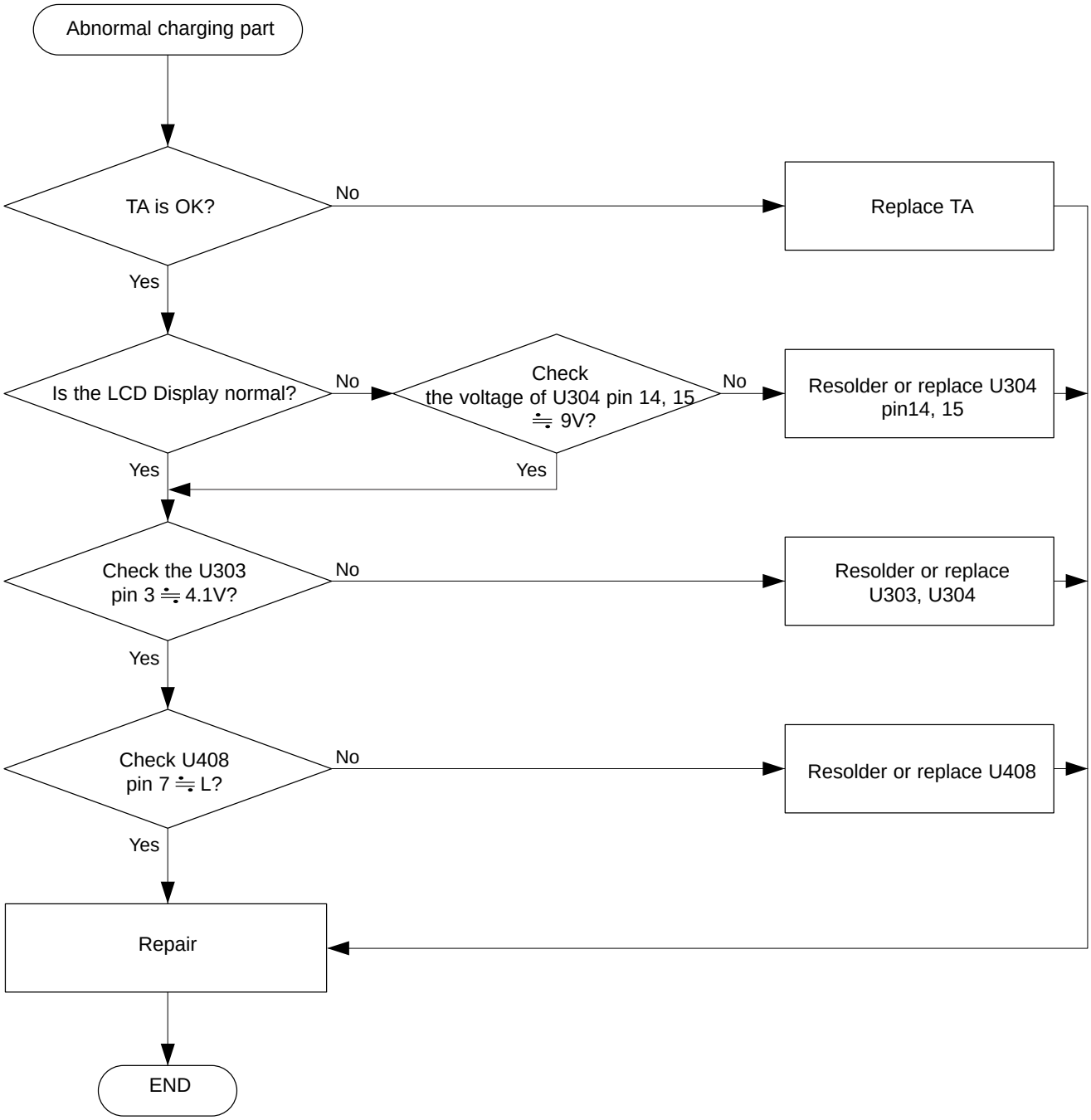
MICROPHONE PART


Microphone does not work
Check the connection from MIC to J1001 (Ear-jack)
Resolder the connection from Mic to J1001 (Ear-jack)
U307 pin 5 (AVCC) ≒ 3.0V?
No
Check the circuit related to U307
Yes
Is there the 13MHz clock signal on U405 pin 64?
No
Check the connection from U408 pin 85 to U405 pin 64
Yes
Check connection from U405 pin 26, 27 to MIC+ and MIC-?
No
Resolder the R413, R417, R419, R420, C430, C407 and C922
Yes
Check connection from U405 pin 21, 22 to MIC+ and MIC-?
No
Resolder the C406, C429, C426 and C425
Yes
END

SPEAKER PART


Speaker does not work
Check the connection from Speaker to SPK+ and SPK-?
No
Resolder the connection from Speaker to SPK+ and SPK-
Yes
U307 pin5 (AVCC) = 3.0V?
No
Check the circuit related to U307
Yes
Is there the 13 MHz clock signal on the U405 pin 64?
No
Check the connection from U408 (kernel) pin 85 to U405 (vocoder) pin 64
Yes
Check the connection from U405 pin 30, 32 to SPK+ and SPK-
No
Resolder the U405 pin 30, 32
Yes
Check the speaker volume level is appropriate
END

CHARGING PART



8. Exploded View and its Parts List

8-1 Main Exploded View

8-2 Main Parts List

8-3 Charger Exploded View

8-4 Charger Parts List

8-5 Travel Adaptor

8-6 Travel Adaptor Parts List

8-7 Ciger Light Adaptor

8-8 Ciger Light Adaptor Part List

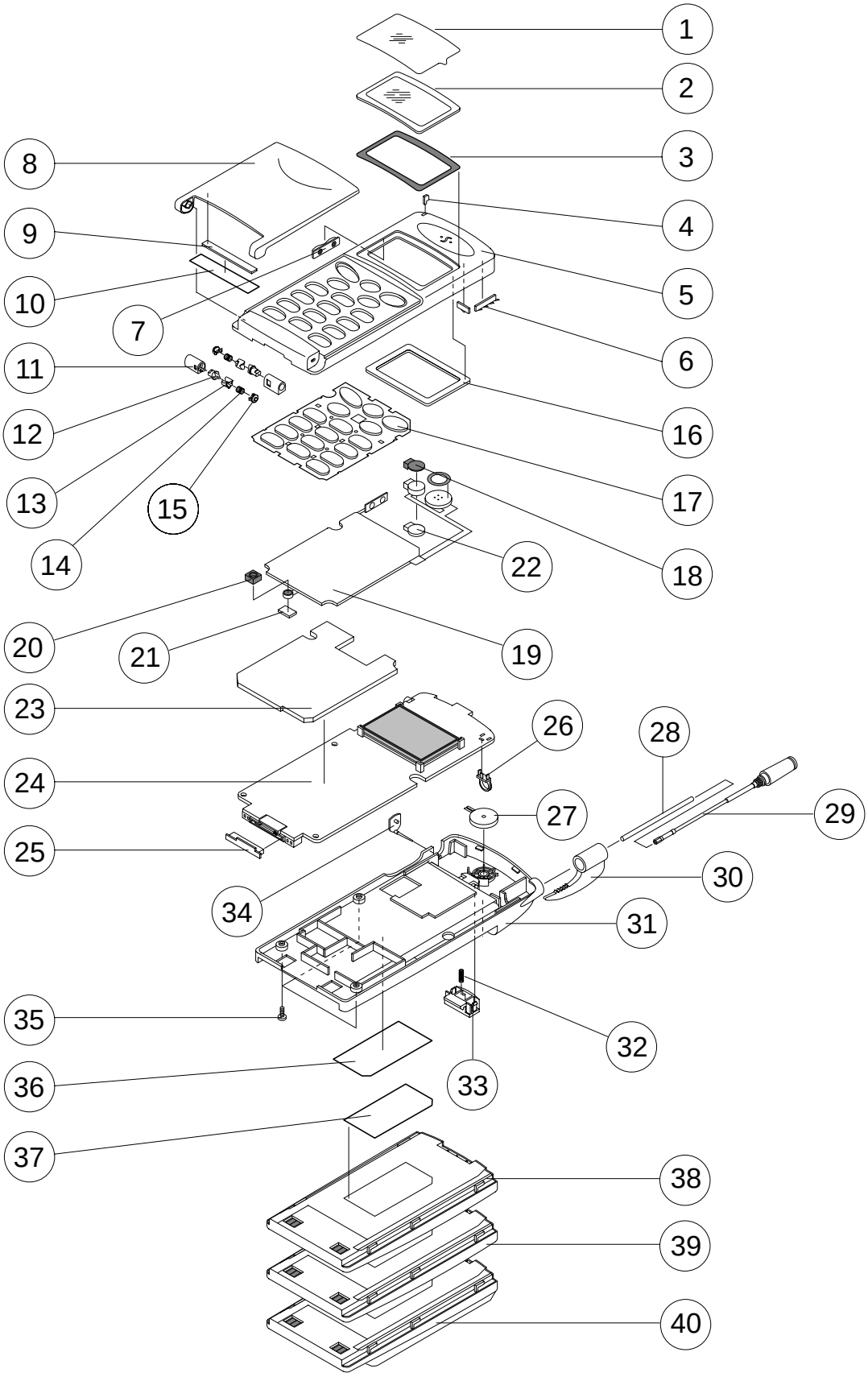
8-9 Hands Free Kit Diagram

8-10 Boost Kit

8-11 Hands Free Car Kit Option

- **8-11-1 Hands Free Car Kit Ass'y**
- **8-11-2 Hands Free Cradle Exploded View**
- **8-11-3 Cradle Mechanism Part List**

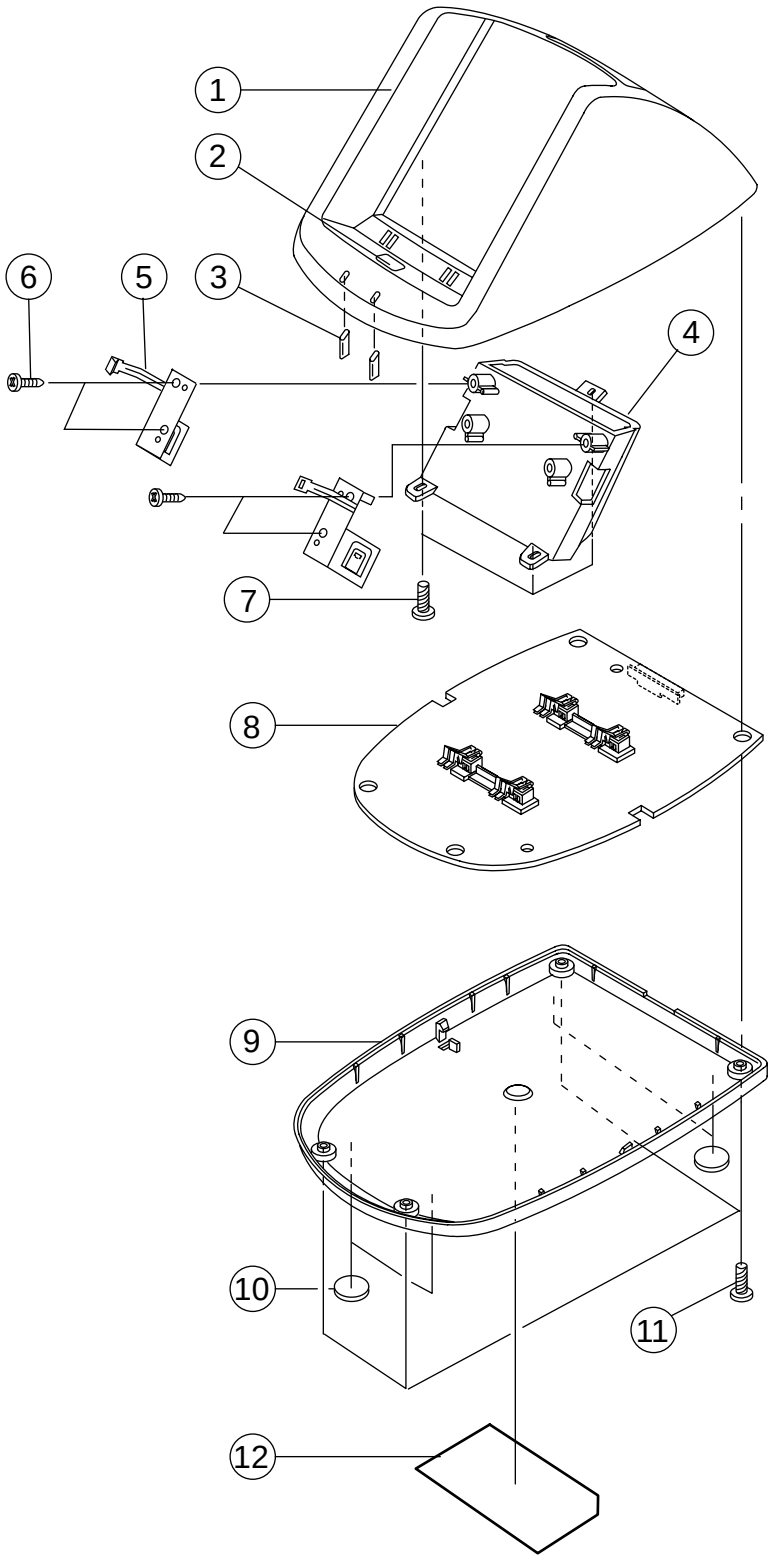
8-1 Main Exploded View



8-2 Main Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
1	TAPE WINDOW BOHO	GH72-10517A	1	
2	LCD WINDOW	GH72-41533A	1	
3	WINDOW TAPE	GH74-40515A	1	
4	LED LENS	GH72-41532A	1	
5	FRONT COVER	GH72-41507A	1	
6	STRIP FINGER A	GH71-10623A	1	
	STRIP FINGER C	GH71-10641A	1	
7	KEY VOLUME	GH73-30005A	1	
8	FLIP COVER	GH72-41509A	1	
9	MAGENETIC	3302-001110	1	
10	MAGENETIC COVER	GH68-31000A	1	
11	HINGE HOUSING	GH72-41543A	2	
12	SHAFT HINGE	GH72-41544A	2	
13	CAM HINGE	GH72-41545A	2	
14	HINGE SPRING	GH61-70018A	2	
15	HOUSING CAP	GH72-41546A	2	
16	SPONGE LCD	GH73-30007A	1	
17	3 x 4 KEY	GH73-30004A	1	
18	RUBBER BUZZER	GH73-30006A	1	
19	KEY PBA	GH96-01126A	1	
20	RUBBER MIC	GH73-40684A	1	
21	MIC COVER	GH74-10745A	1	
22	ISO-TAPE	GH74-40516A	1	
23	SHIELD CAN	GH72-41531A	1	
24	MAIN PBA	GH96-01095A	1	
25	RUBBER CONNECTOR	GH73-40639A	1	
26	ANTT BRACKET	GH71-10703A	1	
27	MOTOR	GH31-10004A	1	
28	ANTENA TUBE		1	
29	ANTENA	GH42-10523A	1	
30	CLIP	GH72-41687A	1	
31	REAR COVER	GH72-41508A	1	
32	LOCKER SPRING	GH70-10516A	1	
33	LOCKER MAIN	GH72-41510A	1	
34	EARPHONE COVER	GH73-40683A	1	
35	SCREW M2 x 5	6001-001148	4	
36	BASE LABEL	GH68-31153A	1	
37	BATT LABEL	GH68-31154A	1	
38	STD BATTERY	GH43-10314A	1	
39	LONG BATTERY	GH43-10333A	1	
40	SLIM BATTERY	GH43-10315A	1	

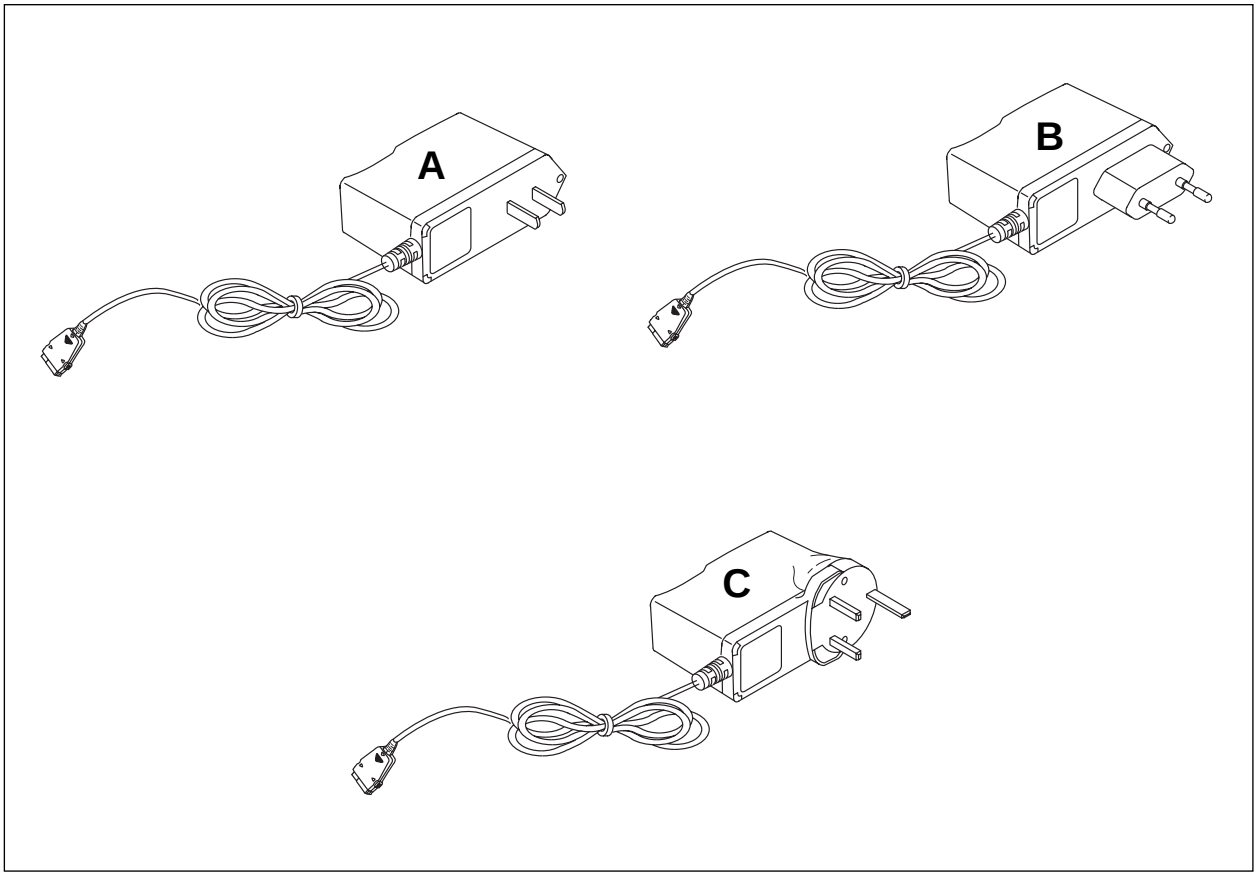
8-3 Charger Exploded View



8-4 Charger Parts List

NO	DESCRIPTION	CODE	Q'TY	REMARK
1	CHARGER UPPER	DMM000043	1	
2	GATE LABEL	DMM500024	1	
3	LED CAP	DMM000053	2	
4	BATTERY HOUSIN	DMM000044	1	
5	HANDY LOCKER	DMM000046	2	
6	SCREW M2.6 x 6	6003-000107	4 EA	
7	SCREW M3 x 6	6003-000115	3 EA	
8	PBA		1	
9	DTC LOWER	DMM000049	1	
10	BUMPON	DMM300004	4	
11	SCREW M3 x 12	6003-000161	4	
12	LABEL	DMM500026	1	

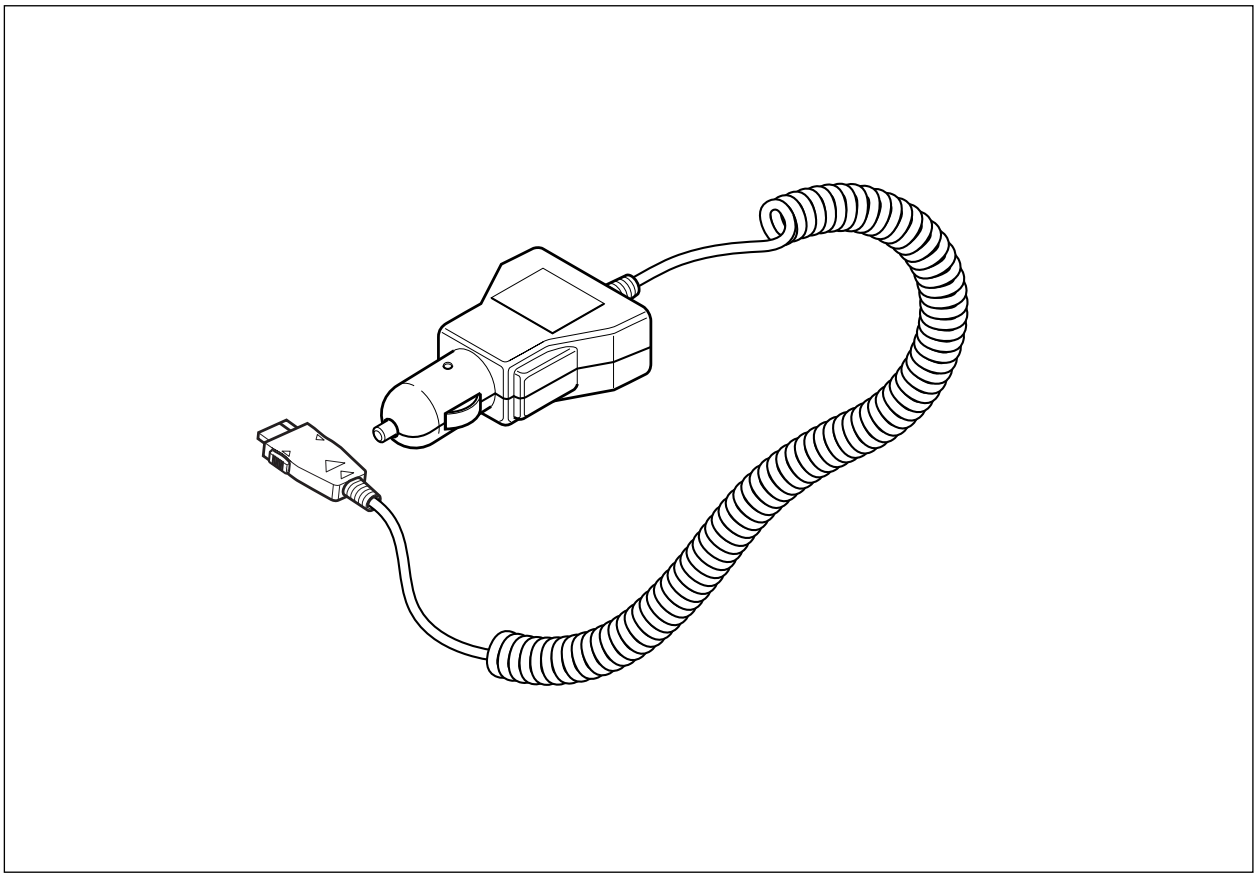
8-5 Travel Adaptor



8-6 Travel Adaptor Parts List

Type	SEC Code	Remark
A	GH44-30548A	CHINA
B	GH44-30549A	EUROPE
C	GH44-30547A	UNITED KINGDOM

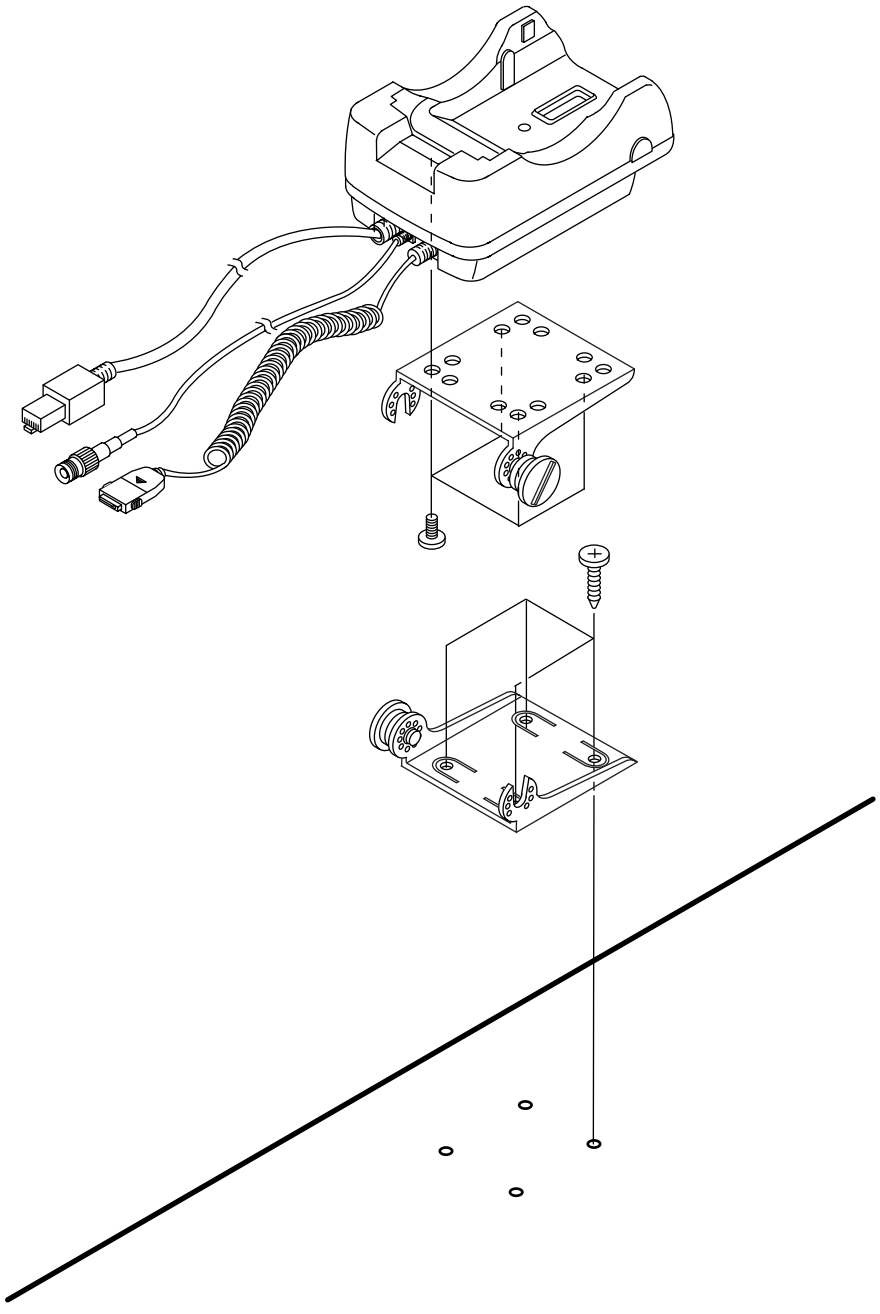
8-7 Ciger Light Adaptor



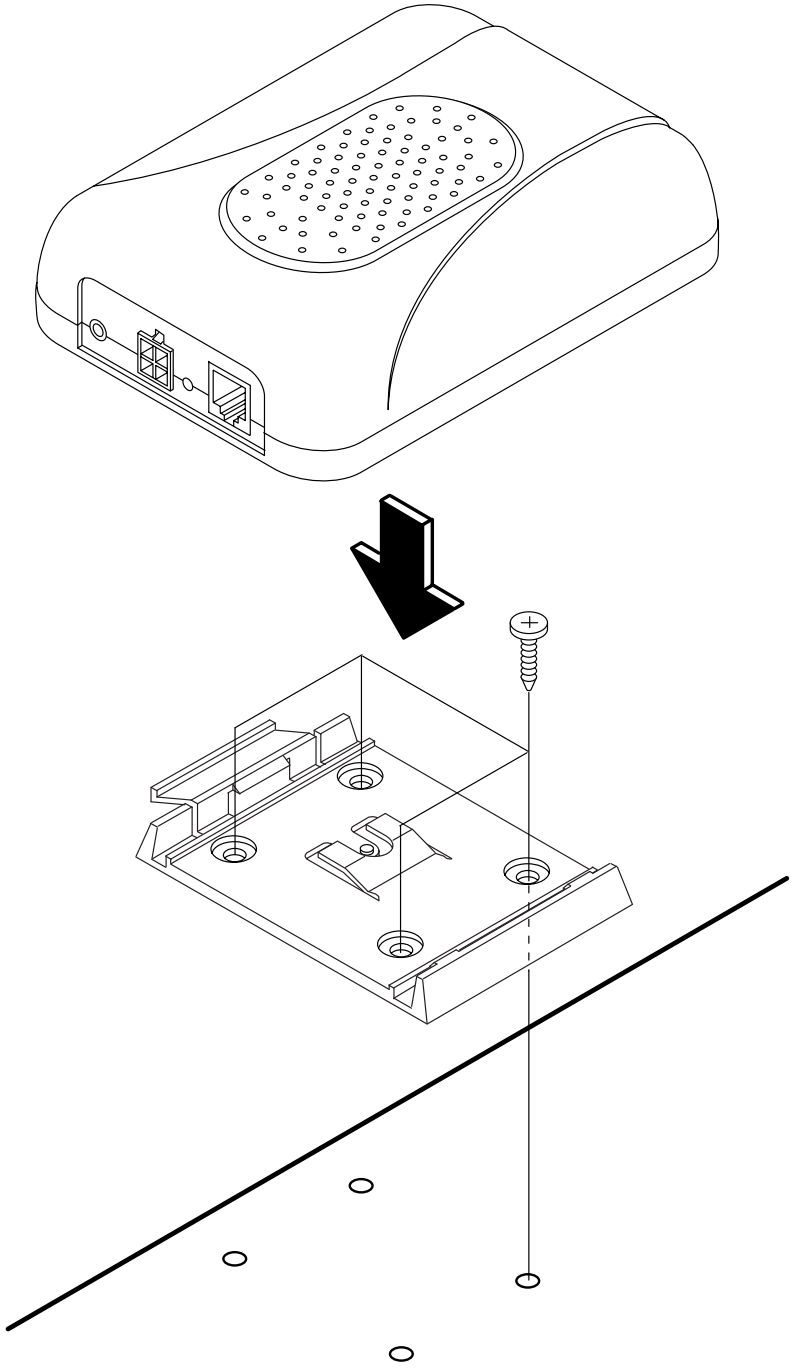
8-8 Ciger Light Adaptor Part List

Description	SEC Code	Remark
Ciger Light Adaptor Code	GH44-30546A	BLACK

8-9 Hands Free Kit Diagram

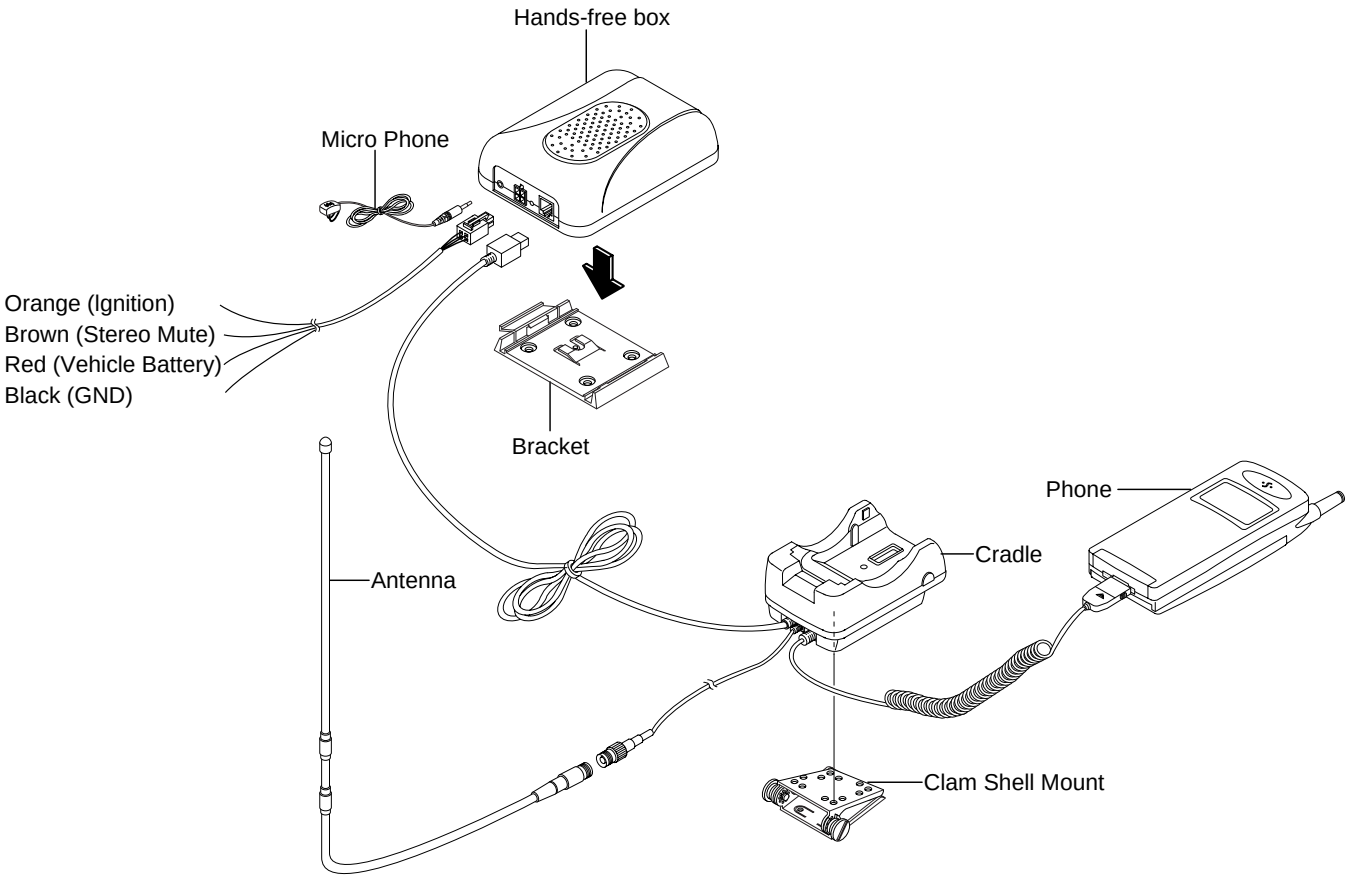


8-10 Boost Kit



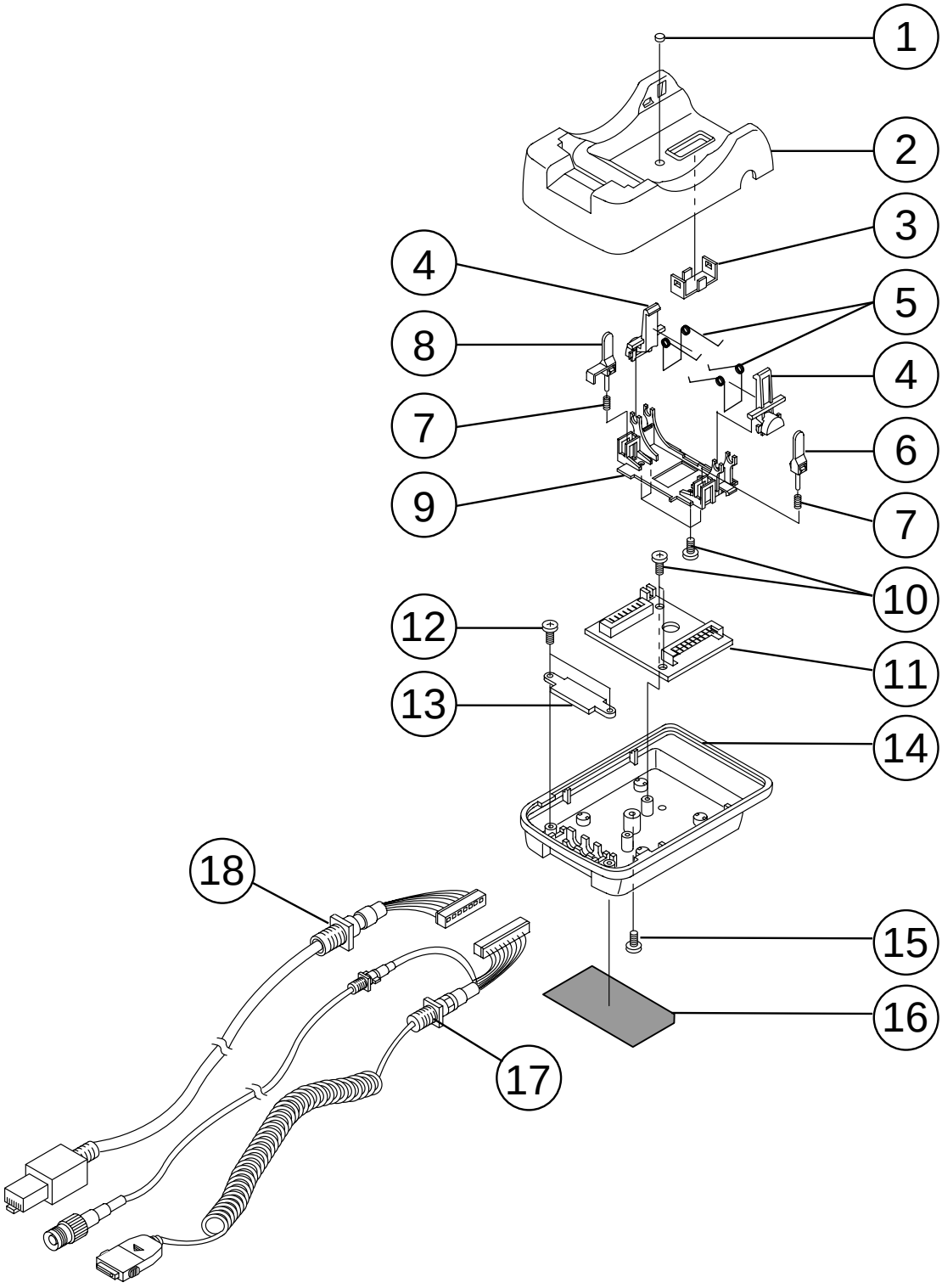
8-11 Hands Free Car Kit Option

8-11-1 Hands Free Car Kit Ass'y



Option Code: GH96-01150A

8-11-2 Hands Free Cradle Exploded View



8-11-3 Cradle Mechanism Part List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
1	GATE LABEL	GH68-11107A	1	
2	CRADLE UPPER	GH72-41519A	1	
3	SOCKET PLATE	GH70-10526A	1	
4	LOCKER	GH72-41521A	2	
5	TORSION SPRING	GH61-70012A	2	
6	EJECTOR PIN(R)	GH72-41524A	1	
7	EJECTOR SPRING	GH70-10520A	2	
8	EJECTOR PIN(L)	GH72-41523A	1	
9	CLAMP	GH72-41522A	1	
10	SCREW M2.6 x 6, +, BH	6003-000107	6	
11	PCB	GH41-10639A	1	
12	SCREW M2 x 6, +, BH	6003-000158	2	
13	CABLE CAP	GH72-41252A	1	
14	CRADLE LOWER	GH72-41520A	1	
15	SCREW M3 x 8, +, BH	6001-000158	1	
16	CRADLE LABEL	GH68-31163A	1	
17	EJECTOR	GH72-41523A		
18	CRADLE DATA CABLE			

7. Electrical Parts List

7-1 Main Top

LOCATION NO.	DESCRIPTION	SEC CODE	REMARK
D302, D303, D304	DIODE-SCHOTTY, UPS5817	0404-001044	
D301	DIODE-ARRAY, DAN222	0407-001002	
D305, D306	DIODE-ARRAY, SMS05-4	0407-001030	
Q300	TR-SMALL SIGNAL, 2SC4081	0501-000218	
U106, U847	TR-DIGITAL, DTC114EEA	0504-000167	
U303, U851, U853, U860	TR-DIGITAL, DTC144EEA	0504-000168	
U403	TR-DIGITAL, DTC114YETL	0504-001012	
U105, U848	TR-DIGITAL, DTB113ZK	0504-001021	
U109, U309, U310	TR-ARRAY, UMC5N	0506-001004	
D300	LED, CHIP, CL-150YG-CD-T	0601-000276	
U842	IC-CMOS LOGIC, TC7S32FU	0801-000796	
U852	IC-CMOS LOGIC, TC7S04FU	0801-002345	
U833	IC-FLASH MEMORY, MBM29LV800T-10PN	1107-001062	
U834	IC-ETC. MEMORY, LRS1306	1109-001081	
U839	IC-BUFFER AMP, UPC2746TB	1201-001326	
U850	IC-OP AMP, MC34119DTB	1201-001341	
U841	IC-VOLFAGECOMP, TC75W56FU	1202-001022	
U103, U108	IC-SWITCH VOL. REG. MIC5205-3.0BM	1203-001285	
U110, U406	IC-VOLTAGE REGULATOR, LP2981AIM5-3.0	1203-001454	
U304	IC-CHARGE, LT1510-5CGN	1203-001515	
U311	IC-VOLTAGE REGULATOR, TC1015-33VCT	1203-001592	
U102	IC-BRIGHT, HD155101BF	1204-001405	
U312	IC-RTC, RS5C372A	1206-001009	
U101	IC-Synthesizer, LMX2336LTMX	1209-001161	
R134, R135, R301	R-CHIP, 100ohm, 5%, 1/16W, DA, TP, 1005	2007-000138	
R404	R-CHIP, 220ohm, 5%, 1/16W, DA, TP, 1005	2007-000139	
R112, R305, R520, R522	R-CHIP, 1Kohm, 5%, 1/16W, DA, TP, 1005	2007-000140	
R137	R-CHIP, 2.2Kohm, 5%, 1/16W, DA, TP, 1005	2007-000141	
R102	R-CHIP, 2.7Kohm, 5%, 1/16W, DA, TP, 1005	2007-000142	
R139	R-CHIP, 4.7Kohm, 5%, 1/16W, DA, TP, 1005	2007-000143	
R128	R-CHIP, 8.2Kohm, 5%, 1/16W, DA, TP, 1005	2007-000147	
R101, R315, R525, R970	R-CHIP, 10Kohm, 5%, 1/16W, DA, TP, 1005	2007-000148	
R113	R-CHIP, 12Kohm, 5%, 1/16W, DA, TP, 1005	2007-000149	
R115	R-CHIP, 47Kohm, 5%, 1/16W, DA, TP, 1005	2007-000157	

LOCATION NO.	DESCRIPTION	SEC CODE	REMARK
R524	R-CHIP, 68Kohm, 5%, 1/16W, DA, TP, 1005	2007-000160	
R123, R126	R-CHIP, 82Kohm, 5%, 1/16W, DA, TP, 1005	2007-000161	
R300, R960, R961, R965, R966	R-CHIP, 100Kohm, 5%, 1/16W, DA, TP, 1005	2007-000162	
R136	R-CHIP, 0ohm, 5%, 1/16W, DA, TP, 1005	2007-000171	
R100, R103, R105, R116, R129, R138, R503	R-CHIP, 10ohm, 5%, 1/16W, DA, TP, 1005	2007-000172	
R107, R108, R109, R117, R120, R121	R-CHIP, 18ohm, 5%, 1/16W, DA, TP, 1005	2007-001288	
R309	R-CHIP, 39ohm, 5%, 1/16W, DA, TP, 1005	2007-001295	
R504	R-CHIP, 51ohm, 5%, 1/16W, DA, TP, 1005	2007-001298	
R131, R132, R133	R-CHIP, 68ohm, 5%, 1/16W, DA, TP, 1005	2007-001301	
R114	R-CHIP, 18Kohm, 5%, 1/16W, DA, TP, 1005	2007-001333	
R306	R-CHIP, 300ohm, 5%, 1/16W, DA, TP, 1005	2007-007008	
R311	R-CHIP, 100Kohm, 1%, 1/16W, DA, TP, 1005	2007-007107	
R302	R-CHIP, 18Kohm, 1%, 1/16W, DA, TP, 1005	2007-007135	
R507	R-CHIP, 10Kohm, 1%, 1/16W, DA, TP, 1005	2007-007142	
R304	R-CHIP, 12Kohm, 1%, 1/16W, DA, TP, 1005	2007-007309	
R307	R-CHIP, 7.5Kohm, 1%, 1/16W, DA, TP, 1005	2007-007470	
R310	R-CHIP, 82Kohm, 1%, 1/16W, DA, TP, 1005	2007-007590	
R303	R-CHIP, 270kohm, 1%, 1/16W, DA, TP, 1005	2007-007592	
R506, R510	R-CHIP, 16Kohm, 1%, 1/16W, DA, TP, 1005	2007-007627	
R505	R-CHIP, 14Kohm, 1%, 1/16W, DA, TP, 1005	2007-007630	
C103, C105, C110, C112, C113, C116, C130, C139, C927	C-CHIP, 100pF, 5%, 50V, TP, 1005	2203-000234	
C125, C143, C144, C148, C149, C153, C155, C175, C176, C317, C931, C973, C974	C-CHIP, 10nF, 10%, 16V, TP, 1005	2203-000254	
C104	C-CHIP, 120pF, 5%, 50V, TP, 1005	2203-000311	
C124	C-CHIP, 150pF, 5%, 50V, TP, 1005	2203-000359	
C119, C122, C135, C152, C163, C169, C924	C-CHIP, 1nF, 10%, 50V, TP, 1005	2203-000438	
C146	C-CHIP, 1pF, 0.25pF, 50V, TP, 1005	2203-000466	
C109	C-CHIP, 2.2nF, 10%, 50V, TP, 1005	2203-000489	
C114, C118, C159, C161, C165, C925, C926, C957	C-CHIP, 22pF, 5%, 50V, TP, 1005	2203-000628	
C162	C-CHIP, 2pF, 0.25pF, 50V, TP, 1005	2203-000696	
C136, C140, C141, C147, C170	C-CHIP, 33pF, 5%, 50V, TP, 1005	2203-000812	
C101, C171, C920	C-CHIP, 3pF, 0.25pF, 50V, TP, 1005	2203-000870	

LOCATION NO.	DESCRIPTION	SEC CODE	REMARK
C120	C-CHIP, 4.7nF, 10%, 50V, TP, 1608	2203-000888	
C138, C949	C-CHIP, 470pF, 10%, 50V, TP, 1005	2203-000941	
C131, C134	C-CHIP, 47pF, 5%, 50V, TP, 1005	2203-000995	
C172	C-CHIP, 4pF, 0.25pF, 50V, TP, 1005	2203-001017	
C142	C-CHIP, 6.8nF, 10%%, 50V, TP, 1608	2203-001103	
C167, C168, C174	C-CHIP, 8pF, 0.5pF, 50V, TP, 1005	2203-001259	
C160	C-CHIP, 0.5pF, 0.25pF, 50V, TP, 1005	2203-001383	
C108	C-CHIP, 12nF, 10%, 50V, TP, 1608	2203-001389	
C948	C-CHIP, 47nF, 10%, 16V, TP, 1005	2203-001432	
C145, C157, C158, C177,	C-CHIP, 2.2uF, +80-20%, 16V, TP, 2012	2203-001598	
C117	C-CHIP, 330pF, 10%, 50V, TP, 1005	2203-002443	
C164	C-CHIP, 1.8pF, 0.25pF, 50V, TP, 1005	2203-005050	
C102, C106, C111, C115, C300, C302, C304, C919	C-CHIP, 100nF, +80-20%, 16V, TP, 1005	2203-005061	
C303, C963, C964, C965, C966, C967, C968, C969, C970	C-CHIP, 1uF, +80-20%, 10V, TP, 1608	2203-005065	
C945, C946, C947	C-CHIP, 220nF, +80-20%, 16V, TP, 1005	2203-005496	
C305	CAP-TANTAL, 6.8uF, 20%, 16V, 3528	2404-000318	
C150	CAP-TANTAL, 1uF, 20%, 10V, 2012	2404-001017	
C151, C154, C173, C316, C961, C962	CAP-TANTAL, 10uF, 20%, 6.3V, 2012	2404-001064	
L104	Inductor, 10nH, 5%, 1608	2703-001040	
L100	Inductor, 8.2nH, 5%, 1608	2703-001167	
L101	Inductor, 82nH, 5%, 1608	2703-001293	
L105	Inductor, 68nH, 5%, 1608	2703-001514	
L106, L108	Inductor, 47nH, 5%, 1608	2703-001545	
L300	Inductor 10uH, 20%, 6.6x4.45x2.8	2703-001740	
X300	CRYSTAL, MC-206	2801-003602	
U104	VCO, ENFVH182S54	2806-001161	
U100	VCO, ENFVH1B2S44	2806-001162	
U849	IF VCO, VOU0540N30KRA	2806-001176	
E6	EMI FILTER, NFM39R12C471T1M	2901-001116	
F100	FILTER-SAW, B4822	2904-001092	
F101	FILTER-SAW, FAR-F5CE-947M50-D235-W	2904-001124	
J301	B'd Connector, AXN720535P	3710-000341	
BAT300	65uAH, Battery, PAS614L	4302-001026	
R532, R502, C922, C921, C923, C100, C123, C137, U838		N.C POINT	
W100	SEMIRIGID CABLE	GH39-20015A	

7-2 Main Bottom

LOCATION NO.	DESCRIPTION	SEC CODE	REMARK
D400	DIODE-SCHOTTY, PRLL5819	0404-001005	
U206	DIODE-SCHOTTY, HSMS2805	0404-001054	
D404	ESD DIODE, SMO5	0406-001005	
D402	ESD DIODE, SM12	0406-001012	
D401	DIODE-ARRAY, UMN1	0407-001007	
D403	DIODE-ARRAY, SMS05-4	0407-001030	
Q401	TR-SMALL SIGNAL, 2SA1576	0501-000162	
Q400	TR-SMALL SIGNAL, 2SD2114KT146	0501-002011	
Q200	TR-SMALL SIGNAL, BFP420	0501-002096	
U401, U407	TR-DIGITAL, DTC144EEA	0504-000168	
U410	TR-ARRAY, UMC5N	0506-001004	
U200	TR-ARRAY, UMZ2N	0506-001024	
U861	IC-CMOS LOGIC, TC7S08FU	0801-000794	
U404	IC-CMOS LOGIC, TC7S04FU	0801-002345	
U412	IC-EEPROM, X24645S8I	1103-001084	
U203	IC-OP AMP, LM7131ACM5	1201-001018	
U411	IC-OP AMP, TLV2264AIPWLE	1201-001289	
U202	IC-POWER AMP, PF01411B	1201-001299	
U400	IC-DC/DC CONVERTER, LTC1555IGN	1203-001289	
U402	IC-DC/DC CONVERTER, TEA1204T	1203-001402	
U307, U406	IC-VOLTAGE REGULATOR, LP2981AIM5-3.0	1203-001454	
U846	IC-RESET, RN5VD27CA-TR	1203-001548	
U408	IC-KERNEL, VP40524B2	1205-001327	
U405	IC-VOCODER, VP40506B4	1205-001328	
TH400	THERMISTOR, 47Kohm, 5%, 4050K, 2.0mW/C, TP	1404-001005	
R475, R476, R477, R478, R479, R482, R483, R484, R485	R-CHIP, 100ohm, 5%, 1/16W, DA, TP, 1005	2007-000138	
R413, R417	R-CHIP, 220ohm, 5%, 1/16W, DA, TP, 1005	2007-000139	
R218, R223, R419, R420, R426	R-CHIP, 1Kohm, 5%, 1/16W, DA, TP, 1005	2007-000140	
R124, R125, R127, R130, R438, R439,	R-CHIP, 2.2Kohm, 5%, 1/16W, DA, TP, 1005	2007-000141	
R200	R-CHIP, 2.7Kohm, 5%, 1/16W, DA, TP, 1005	2007-000142	
R202, R213, R425	R-CHIP, 4.7Kohm, 5%, 1/16W, DA, TP, 1005	2007-000143	
R224	R-CHIP, 8.2Kohm, 5%, 1/16W, DA, TP, 1005	2007-000147	

LOCATION NO.	DESCRIPTION	SEC CODE	REMARK
R205, R219, R403, R410, R411, R418, R422, R423, R427, R429, R433, R435, R526, R527, R967, R968, R969	R-CHIP, 10Kohm, 5%, 1/16W, DA, TP, 1005	2007-000148	
R214	R-CHIP, 12Kohm, 5%, 1/16W, DA, TP, 1005	2007-000149	
R216	R-CHIP, 15Kohm, 5%, 1/16W, DA, TP, 1005	2007-000151	
R215	R-CHIP, 22Kohm, 5%, 1/16W, DA, TP, 1005	2007-000153	
R217, R440, R442, R474	R-CHIP, 47Kohm, 5%, 1/16W, DA, TP, 1005	2007-000157	
R424	R-CHIP, 56Kohm, 5%, 1/16W, DA, TP, 1005	2007-000159	
R400, R401, R402, R421, R428, R430, R432, R434, R436, R437, R441, R500, R964	R-CHIP, 100Kohm, 5%, 1/16W, DA, TP, 1005	2007-000162	
R201, R406, R498	R-CHIP, 0ohm, 5%, 1/16W, DA, TP, 1005	2007-000171	
R204, R206, R207, R414, R415, R480, R481	R-CHIP, 10ohm, 5%, 1/16W, DA, TP, 1005	2007-000172	
R455, R457	R-CHIP, 330Kohm, 5%, 1/16W, DA, TP, 1005	2007-000758	
R203	R-CHIP, 39Kohm, 5%, 1/16W, DA, TP, 1005	2007-000831	
R220	R-CHIP, 470ohm, 5%, 1/16W, DA, TP, 1005	2007-000932	
R408	R-CHIP, 560Kohm, 5%, 1/16W, DA, TP, 1005	2007-001025	
R211	R-CHIP, 680ohm, 5%, 1/16W, DA, TP, 1005	2007-001119	
R210	R-CHIP, 30ohm, 5%, 1/16W, DA, TP, 1005	2007-001291	
R221, R222	R-CHIP, 33ohm, 5%, 1/16W, DA, TP, 1005	2007-001292	
R208, R209	R-CHIP, 180ohm, 5%, 1/16W, DA, TP, 1005	2007-001307	
R521	R-CHIP, 820ohm, 5%, 1/16W, DA, TP, 1005	2007-001316	
R467, R469, R470, R471	R-CHIP, 1.2Kohm, 5%, 1/16W, DA, TP, 1005	2007-001319	
R464	R-CHIP, 1.8Kohm, 5%, 1/16W, DA, TP, 1005	2007-001320	
R212	R-CHIP, 3.3Kohm, 5%, 1/16W, DA, TP, 1005	2007-001325	
R225	R-CHIP, 560ohm, 5%, 1/16W, DA, TP, 1005	2007-002797	
R446, R463	R-CHIP, 4.7Kohm, 1%, 1/16W, DA, TP, 1005	2007-007136	
R473	R-CHIP, 240ohm, 5%, 1/16W, DA, TP, 1005	2007-007141	
R445, R448, R461, R451, R453, R456, R458, R462	R-CHIP, 10Kohm, 1%, 1/16W, DA, TP, 1005	2007-007142	
R449, R450, R454, R460,	R-CHIP, 22Kohm, 1%, 1/16W, DA, TP, 1005	2007-007311	
R443, R452, R459, R468	R-CHIP, 1Kohm, 1%, 1/16W, DA, TP, 1005	2007-007318	
R409	R-CHIP, 130Kohm, 5%, 1/16W, DA, TP, 1005	2007-007480	
R444, R447, R465, R466	R-CHIP, 470ohm, 1%, 1/16W, DA, TP, 1005	2007-007586	
C209, C214, C226, C227, C229, C233, C401, C468, C469, C470, C471, C472	C-CHIP, 100pF, 5%, 50V, TP, 1005	2203-000234	

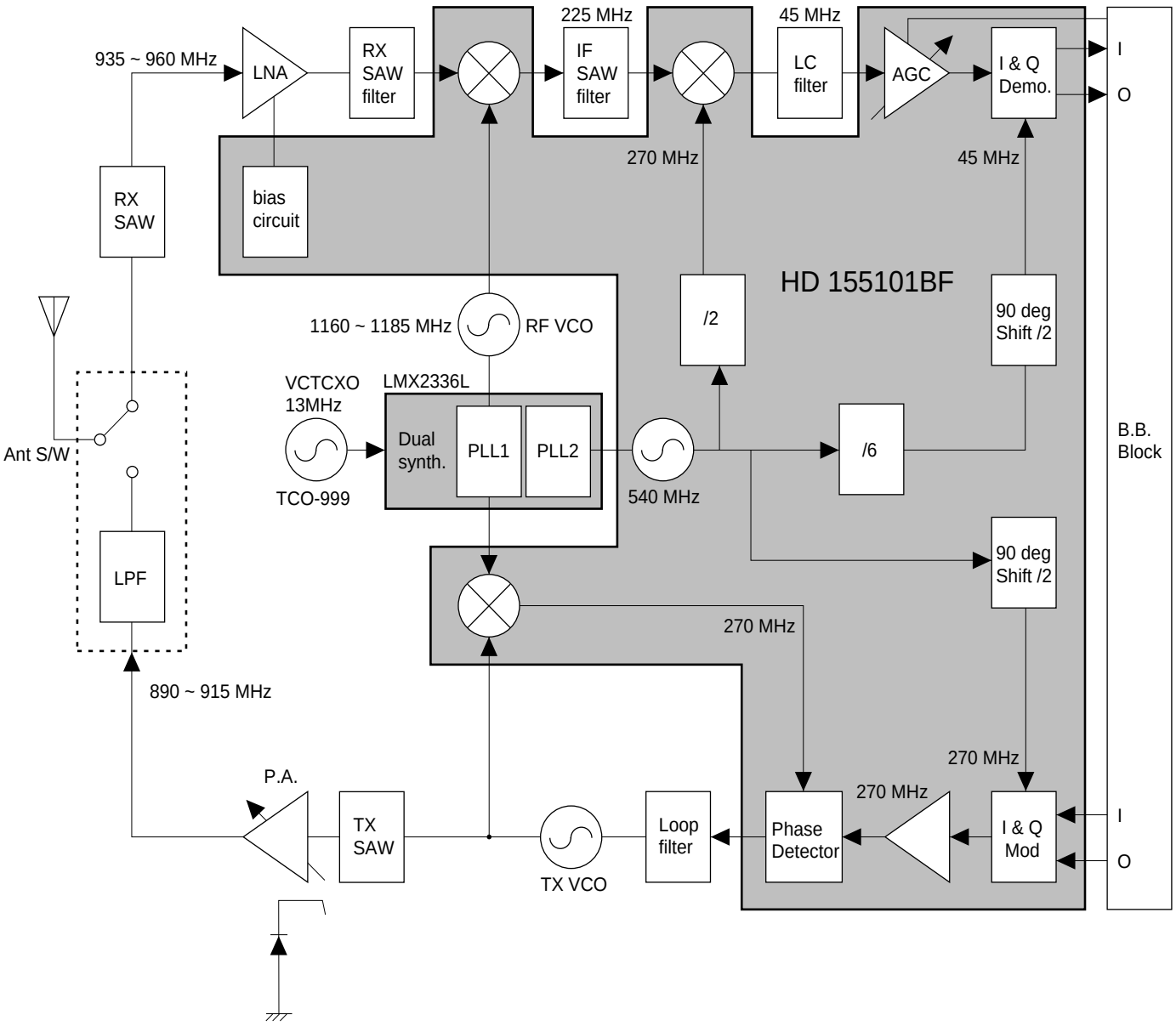
LOCATION NO.	DESCRIPTION	SEC CODE	REMARK
C107, C200, C201, C202, C206, C207, C215, C315, C405, C419, C421, C422, C423, C427, C428, C438, C440, C441, C442, C458, C462, C950, C971, C972	C-CHIP, 10nF, 10%, 16V, TP, 1005	2203-000254	
C203, C220, C451, C455, C935, C936	C-CHIP, 1nF, 10%, 50V, TP, 1005	2203-000438	
C446, C459	C-CHIP, 2.2nF, 10%, 50V, TP, 1005	2203-000489	
C210	C-CHIP, 220pF, 10%, 50V, TP, 1005	2203-000585	
C213, C956	C-CHIP, 22pF, 5%, 50V, TP, 1005	2203-000628	
C216, C221	C-CHIP, 27pF, 5%, 50V, TP, 1005	2203-000679	
C445, C464	C-CHIP, 3.3nF, 10%, 50V, TP, 1005	2203-000714	
C447, C457	C-CHIP, 3.9nF, 10%, 50V, TP, 1005	2203-000725	
C208, C219, C223, C225, C224, C943	C-CHIP, 33pF, 5%, 50V, TP, 1005	2203-000812	
C444, C463	C-CHIP, 5.6nF, 10%, 25V, TP, 1005	2203-001033	
C212, C453	C-CHIP, 820pF, 10%, 50V, TP, 1005	2203-001221	
C205	C-CHIP, 8pF, 0.5pF, 50V, TP, 1005	2203-001259	
C424, C431, C434, C450, C452	C-CHIP, 47nF, 10%, 16V, TP, 1005	2203-001432	
C204	C-CHIP, 75pF, 5%, 50V, TP, 1005	2203-001441	
C448, C449, C454, C456	C-CHIP, 330pF, 10%, 50V, TP, 1005	2203-002443	
C460	C-CHIP, 560pF, 10%, 50V, TP, 1005	2203-002525	
C406, C429	C-CHIP, 150nF, +80-20%, 16V, TP, 1608	2203-005015	
C218	C-CHIP, 3.3pF, 0.25pF, 50V, TP, 1005	2203-005052	
C435, C439, C461, C465, C466, C467	C-CHIP, 100nF, +80-20%, 16V, TP, 1005	2203-005061	
C230, C311, C413, C414, C415, C418, C420, C436	C-CHIP, 1uF, +80-20%, 10V, TP, 1608	2203-005065	
C933	C-CHIP, 10uF, +80-20%, 10V,	2203-005437	
C941	C-CHIP, 220nF, +80-20%, 16V, TP, 1005	2203-005496	
C430	CAP-TANTAL, 47uF, 20%, 6.3V, 3528	2404-001039	
C314, C409, C410, C437	CAP-TANTAL, 10uF, 20%, 6.3V, 2012	2404-001064	
C228, C404	CAP-TANTAL, 220uF, 20%, 6.3V, 7125	2404-001083	
C942	CAP-TANTAL, 4.7uF, 20%, 6.3V, 2012	2404-001086	
L402, L404	Inductor, 1000uH, 20%, 1210-ac13225	2703-000153	
L205, L206	Inductor, 10nH, 5%, 1608	2703-001040	
L207	Inductor, 4.7nH, 10%, 1608	2703-001165	
L200, L203	Inductor, 18nH, 5%, 1608	2703-001189	
L201, L202	Inductor, 82nH, 5%, 1608	2703-001293	

LOCATION NO.	DESCRIPTION	SEC CODE	REMARK
L401, L403	Inductor, 680uH, 20%, 3225	2703-001417	
L204	Inductor, 100nH, 5%, 1608	2703-001513	
L208	Inductor, 33nH, 5%, 1608	2703-001543	
L400	Inductor, 22uH, 20%, 6.0x6.0x2.9mm	2703-001683	
U201	VCTCXO, TCO-999	2809-001212	
F200	FILTER-SAW, FAR-F5CJ-947M50-L213	2904-001094	
F201	TX SAW FILTER, SAFC902.5MC90T-TC11	2904-001118	
U204	IC-SWITCH, LMS30L0897H103	2909-001072	
FB100	FERITE BEAD, BLM31P500SPT	3301-001177	
J400	SIM CONNECTOR, 2-338063-2	3709-001088	
M400	VIBRATOR CONNECTOR, 24-8005-002-000-007	3710-001105	
J401	IF CONNECTOR, MQ/S179-SAA-18P/4	3710-001302	
J1001	EARPHONE JACK, 02-699B0-53BKA	3722-001303	
U205	COUPLER, DCS314E	4709-001124	
R472, R407, C400, R971, C940, C407, C443, C217, C222, C211		N.C POINT	
A100	ANTENNA, 70183.1	GH42-10523A	

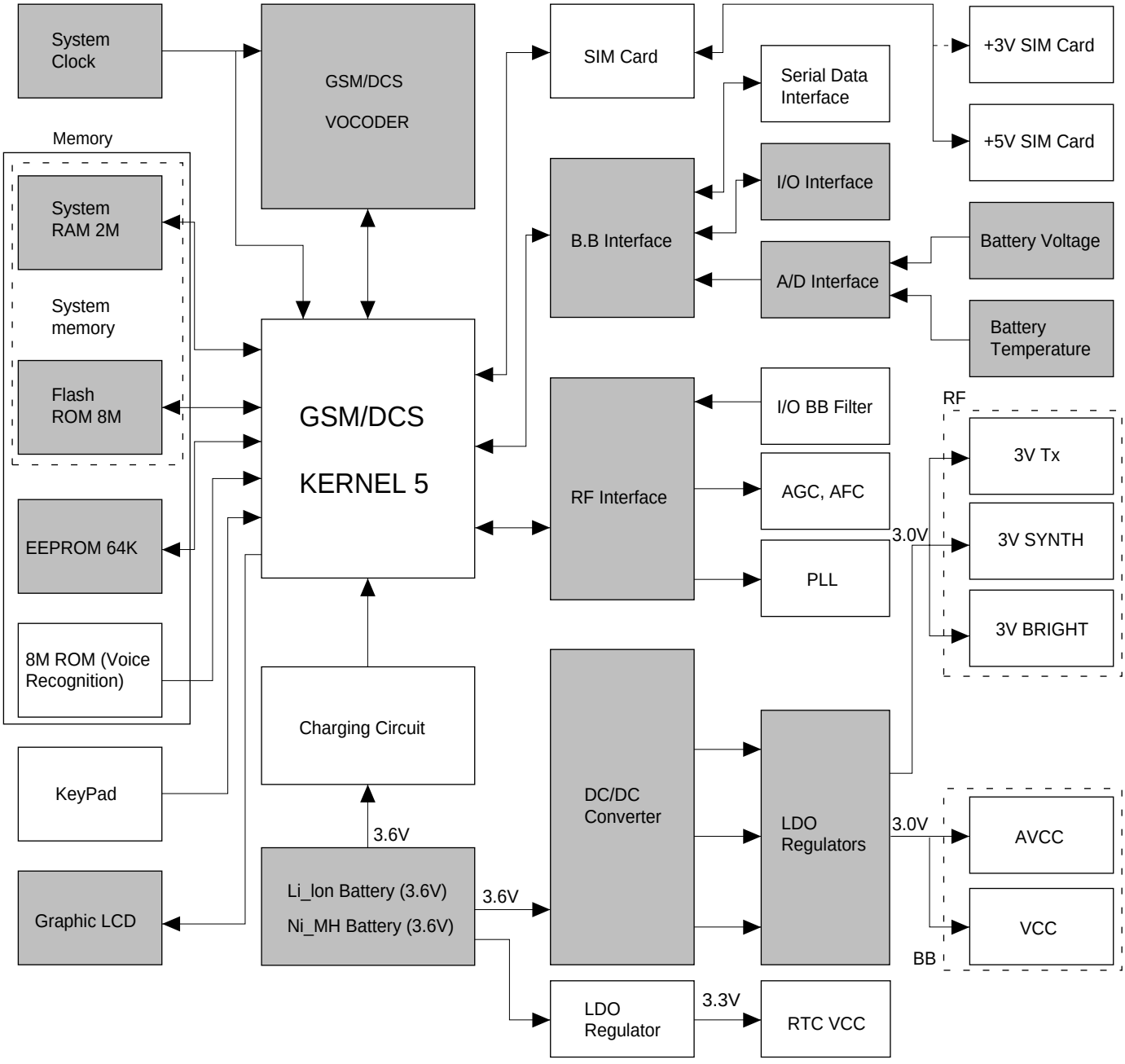
MEMO

9. Block Diagram

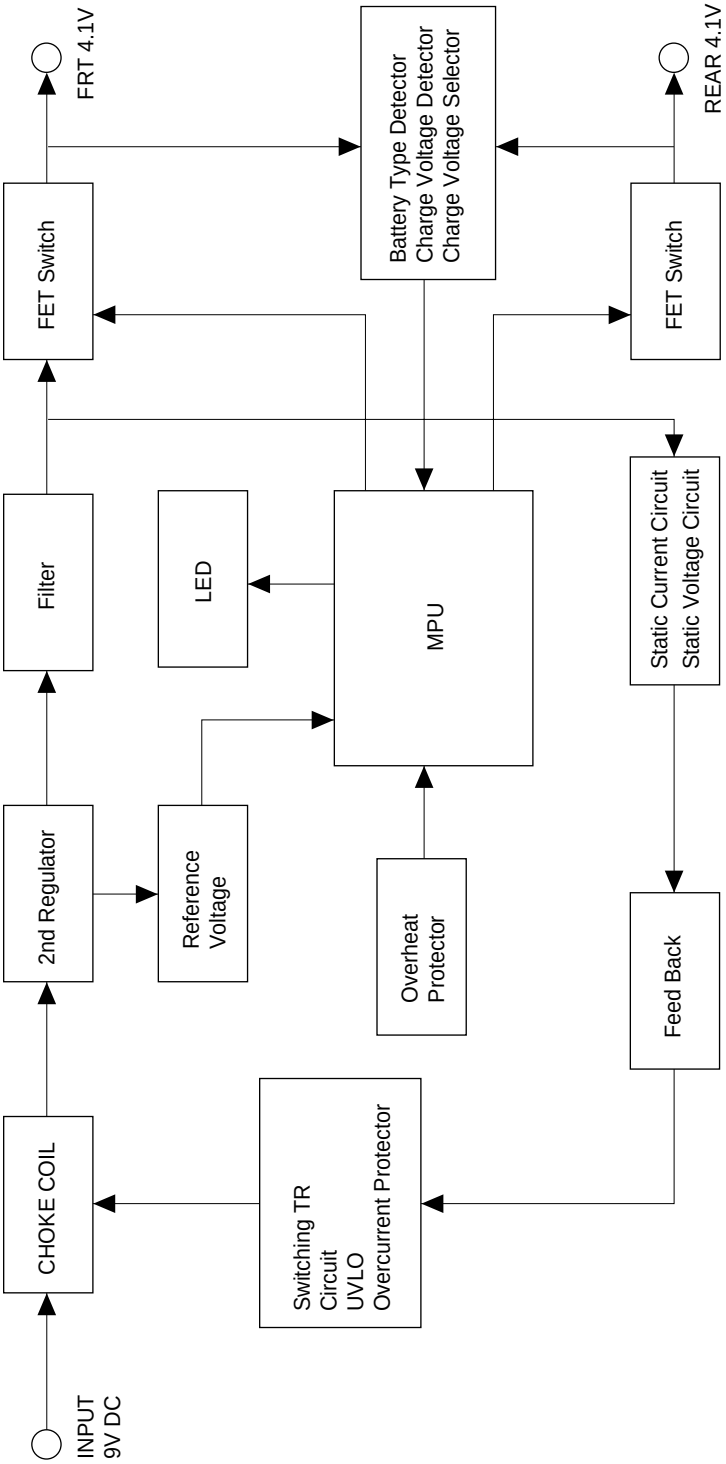
9-1 RF Block Diagram



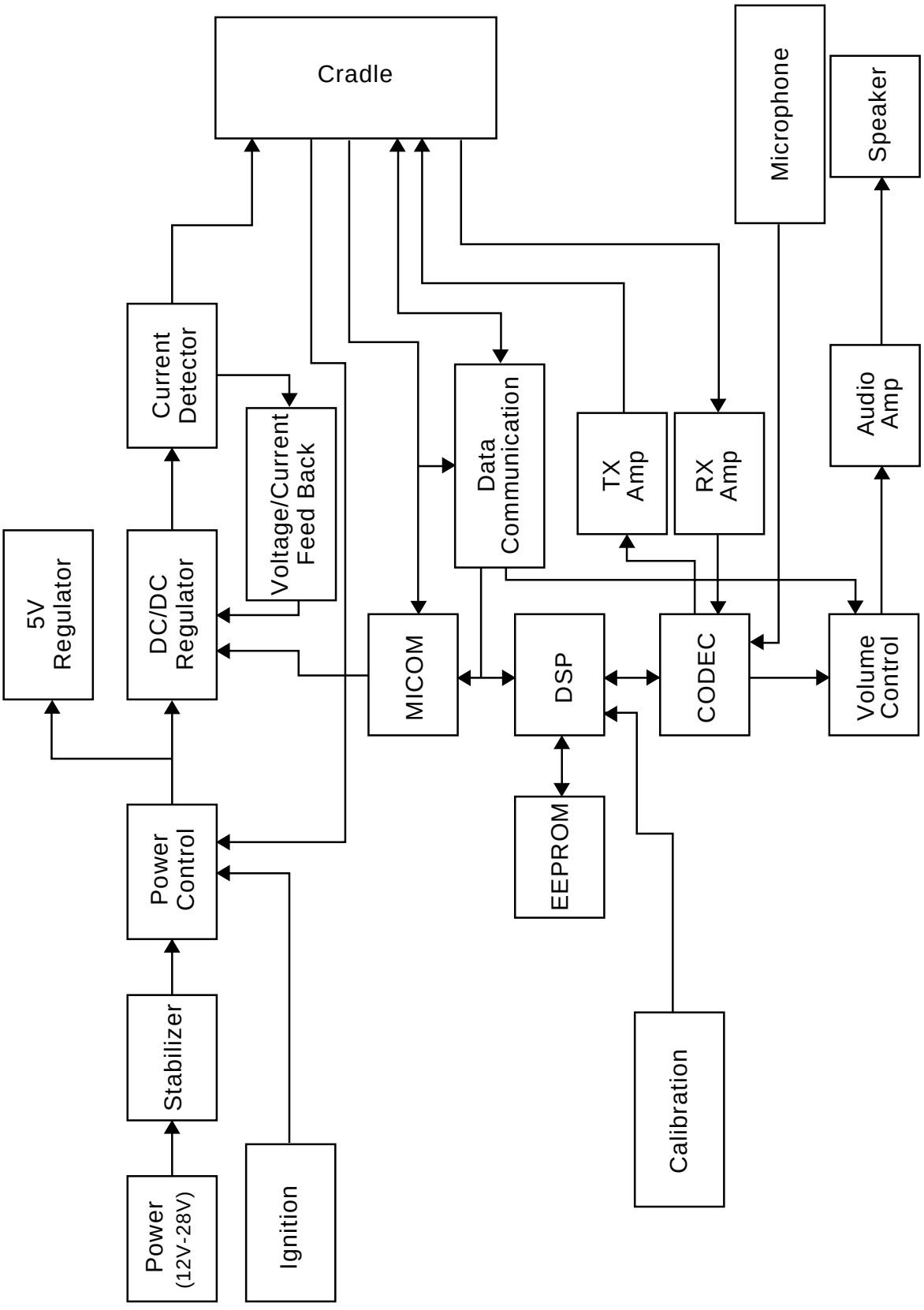
9-2 Baseband Block Diagram

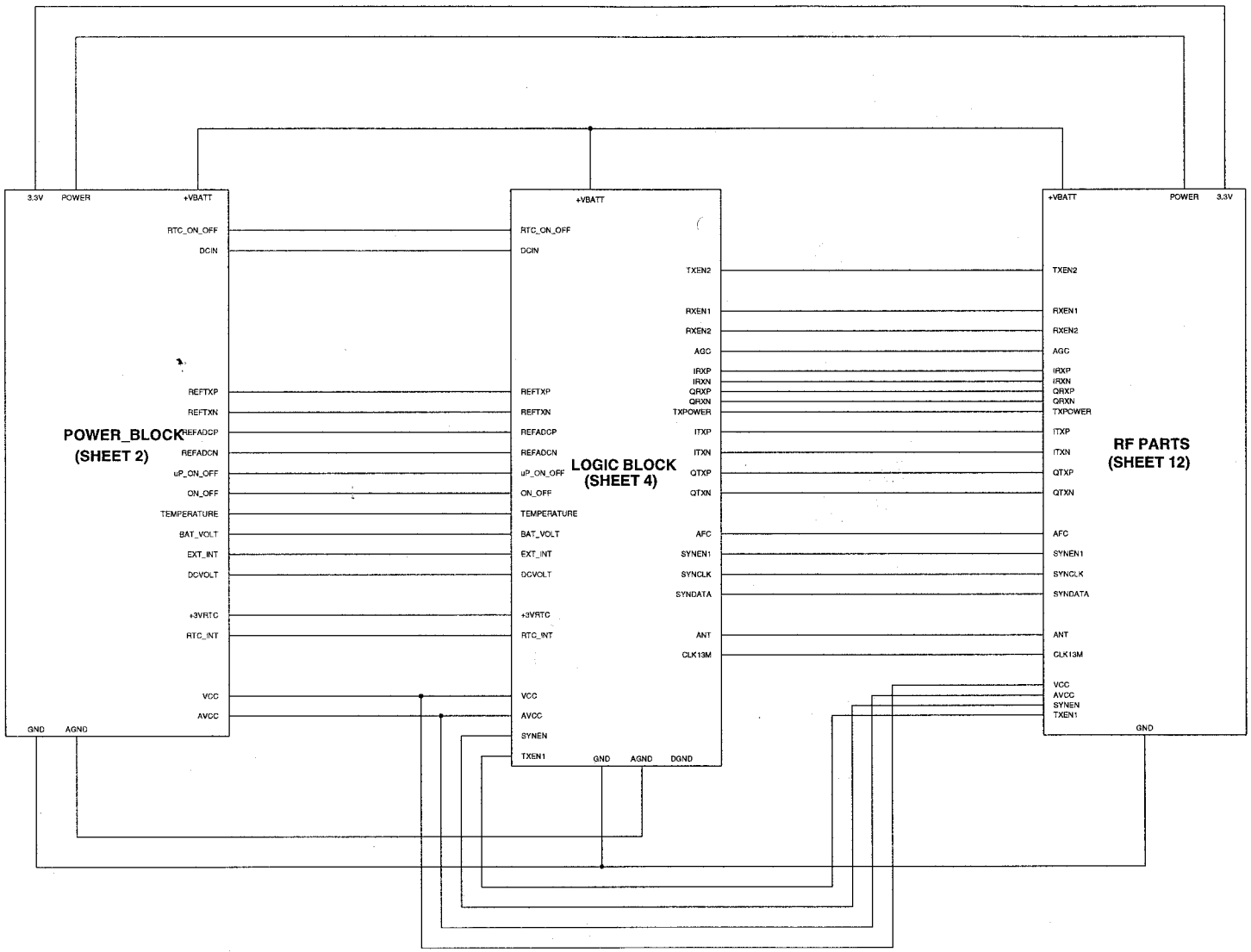


9-3 DTC Block Diagram

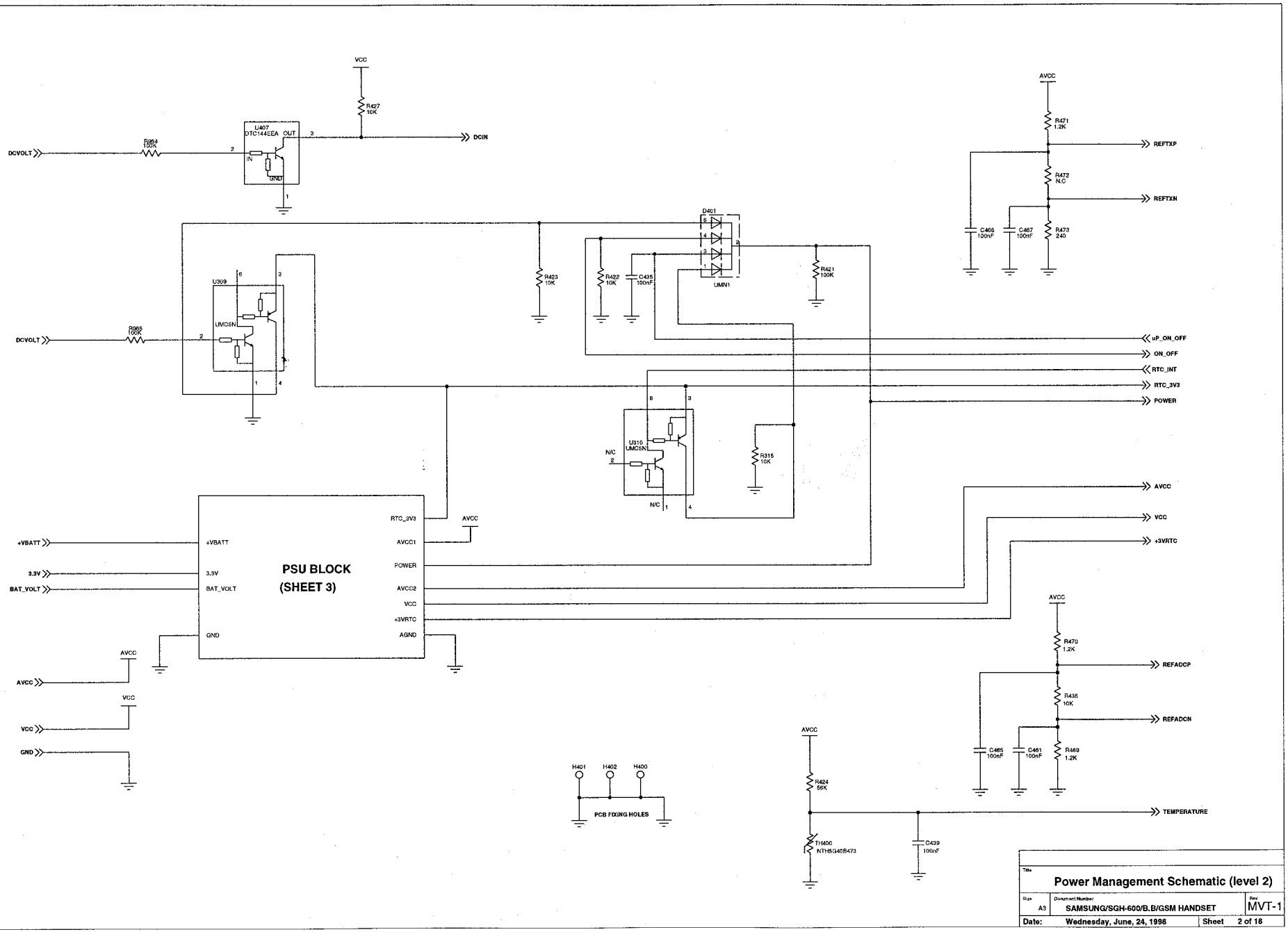


9-4 HFK Block Diagram

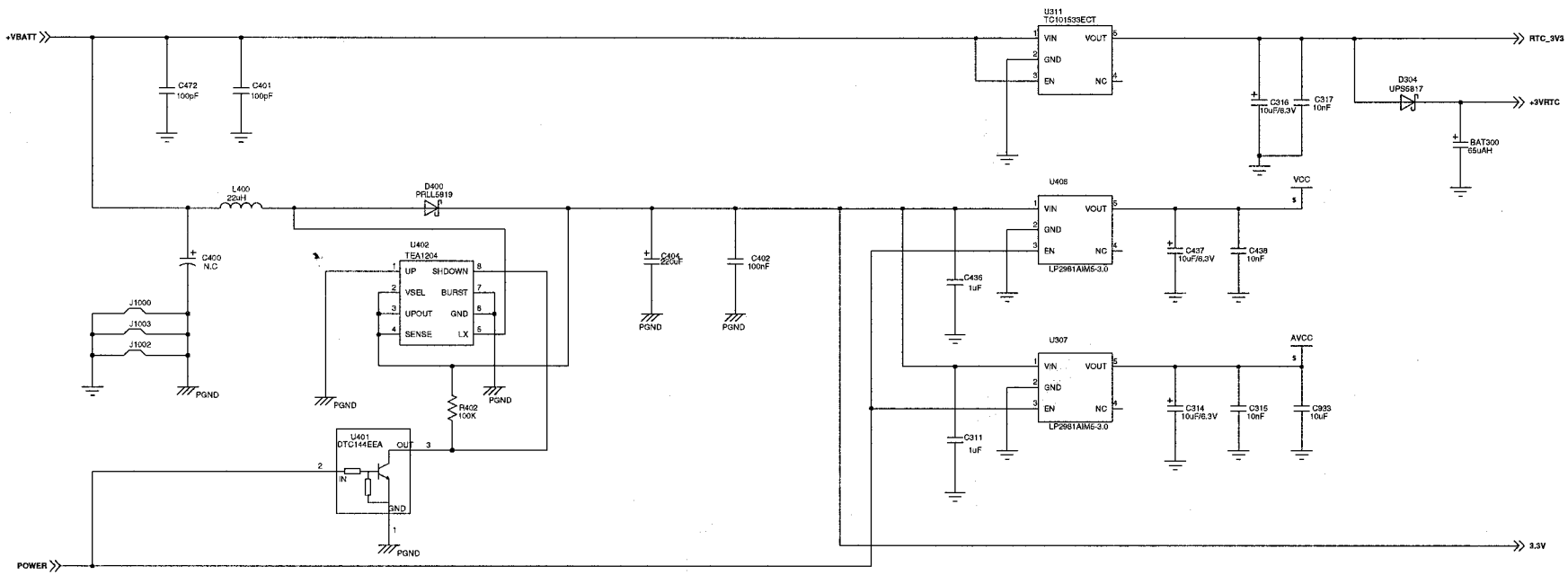




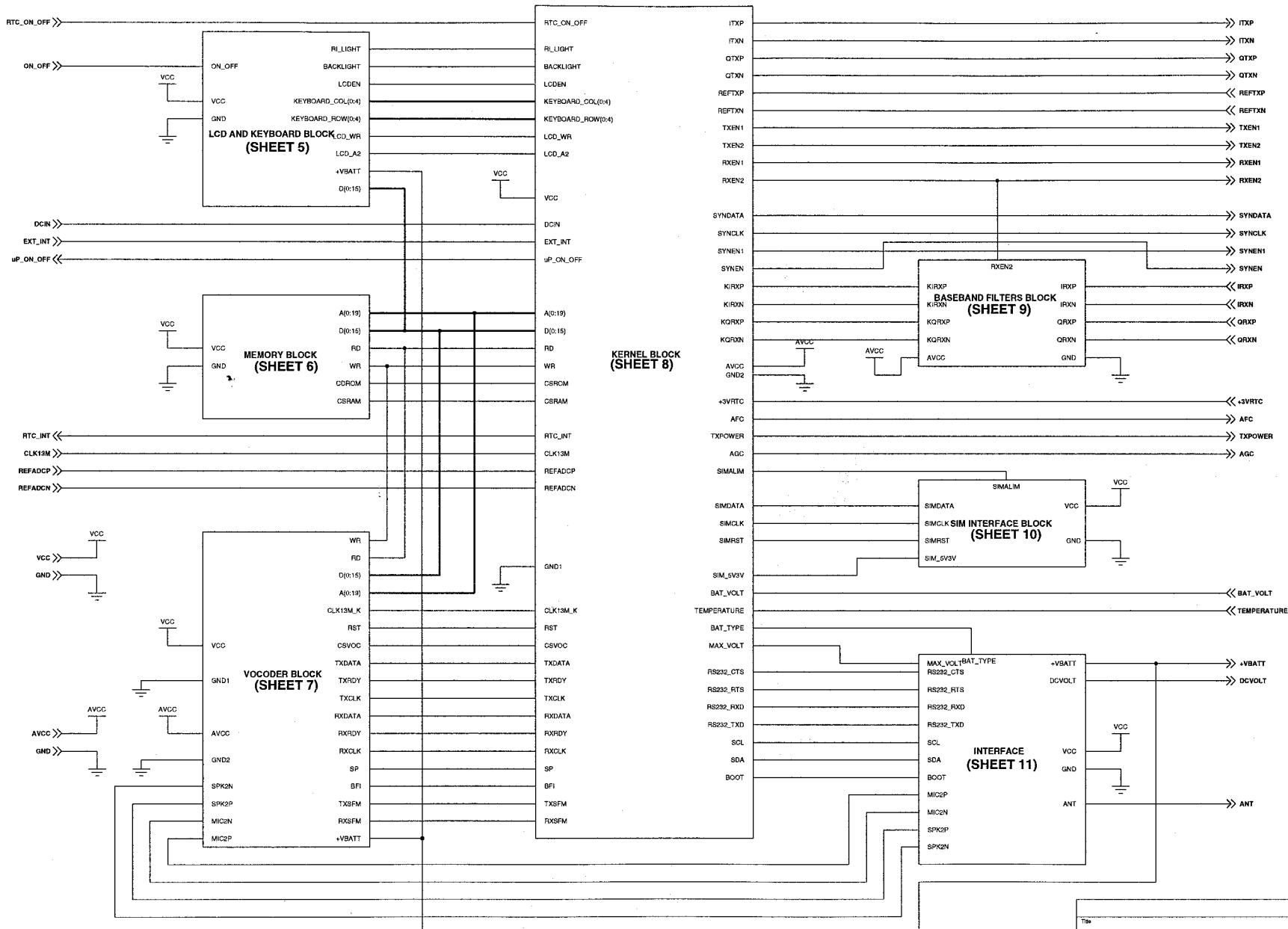
Title: GSM Handset Schematic (Top Level)		
Size: A3	Document Number: SAMSUNG/SGH-600/B.B/GSM HANDSET	Rev: Rev4.0
Date: Monday, Sep, 14, 1998	Sheet 1 of 18	



Title	Power Management Schematic (level 2)	
Size: A3	Document Number: SAMSUNG/SGH-600/B.B/GSM HANDSET	Rev: MVT-1
Date: Wednesday, June, 24, 1996	Sheet 2 of 16	

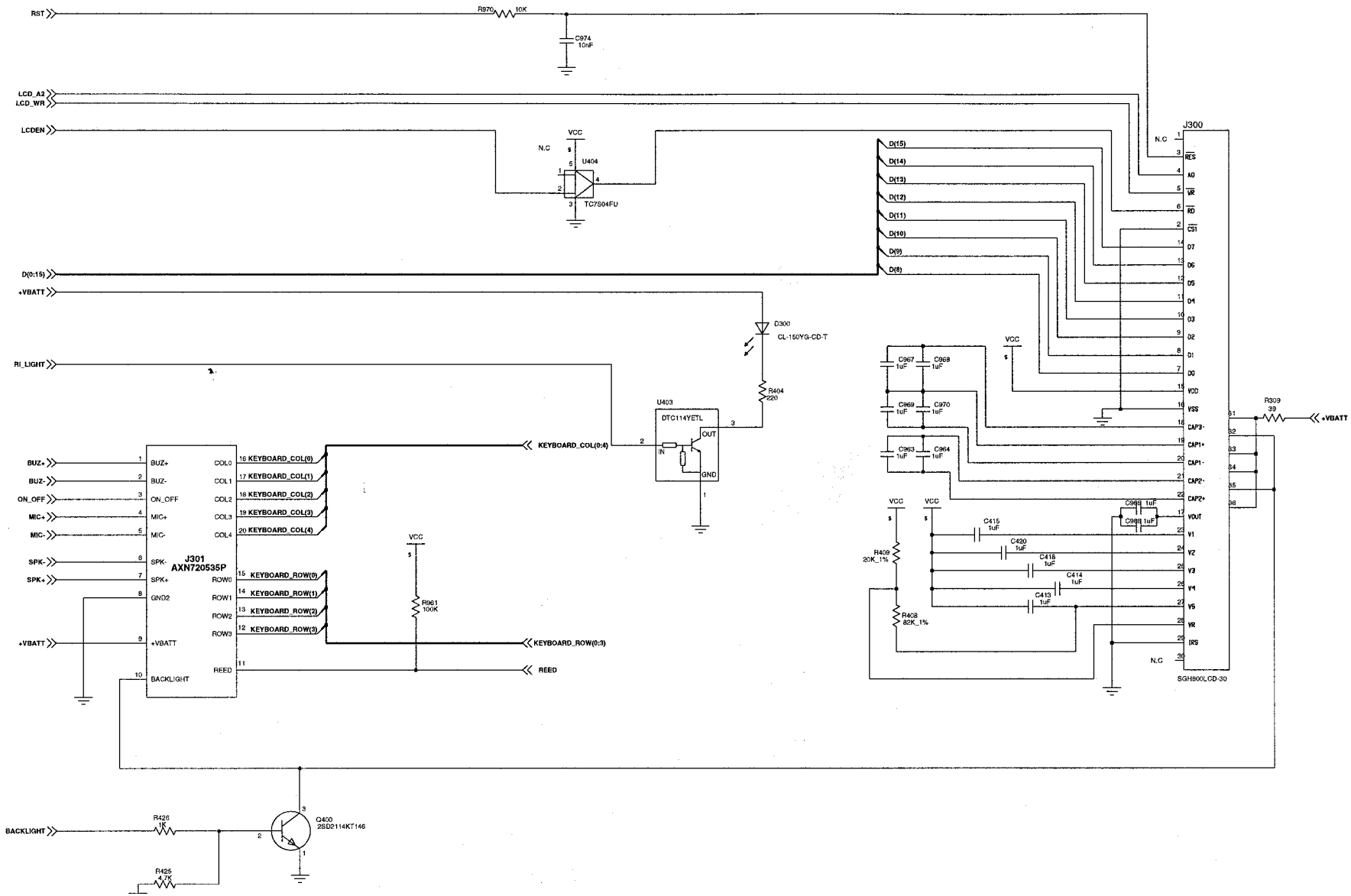


Title: PSU Schematic		
Size: A3	Document Number: SAMSUNG/SGH-600/B.B/PSU	Rev: MVT-1
Date: Wednesday, June, 24, 1998	Sheet 3 of 18	

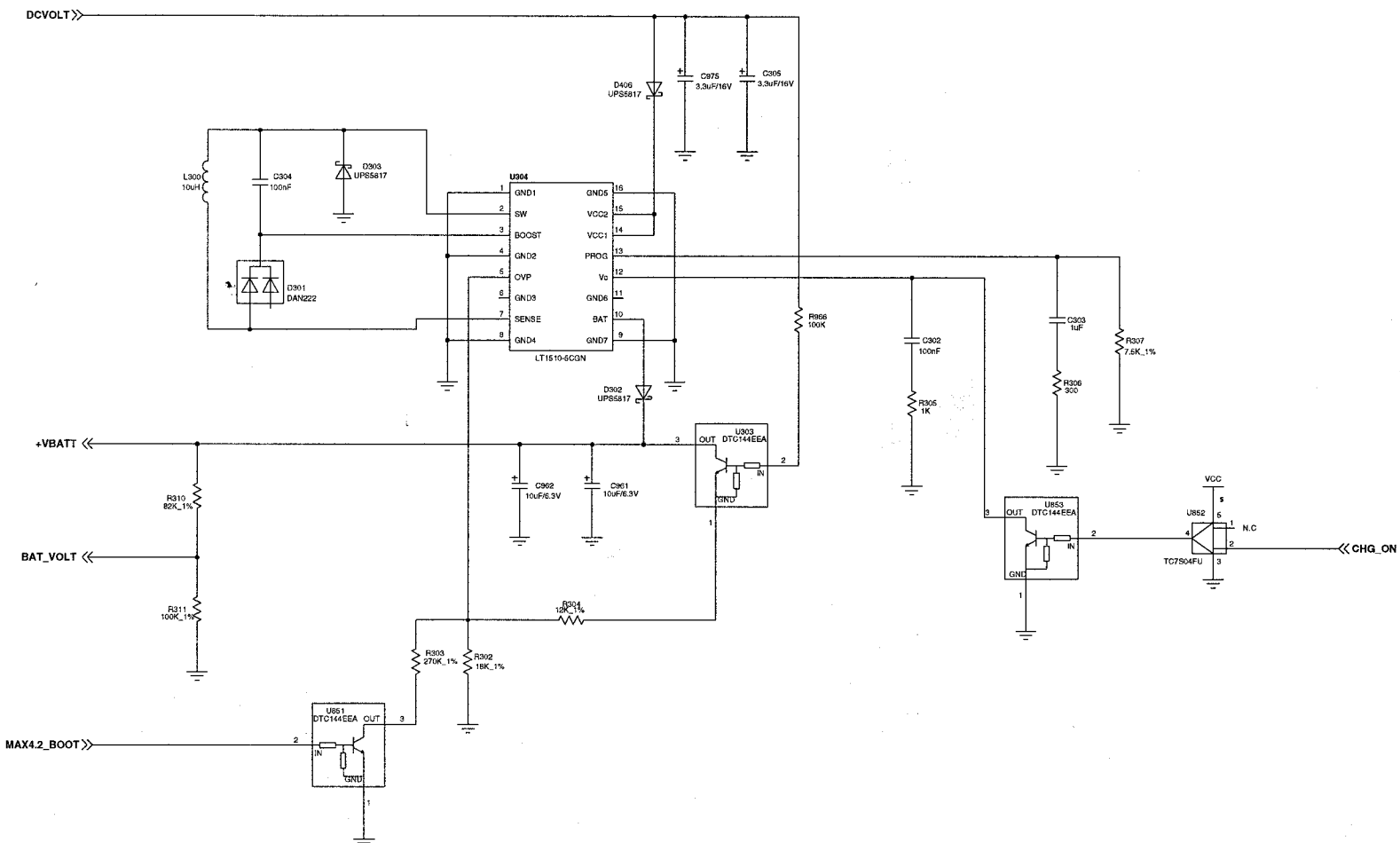


Title: **Logic Schematic (level 2)**

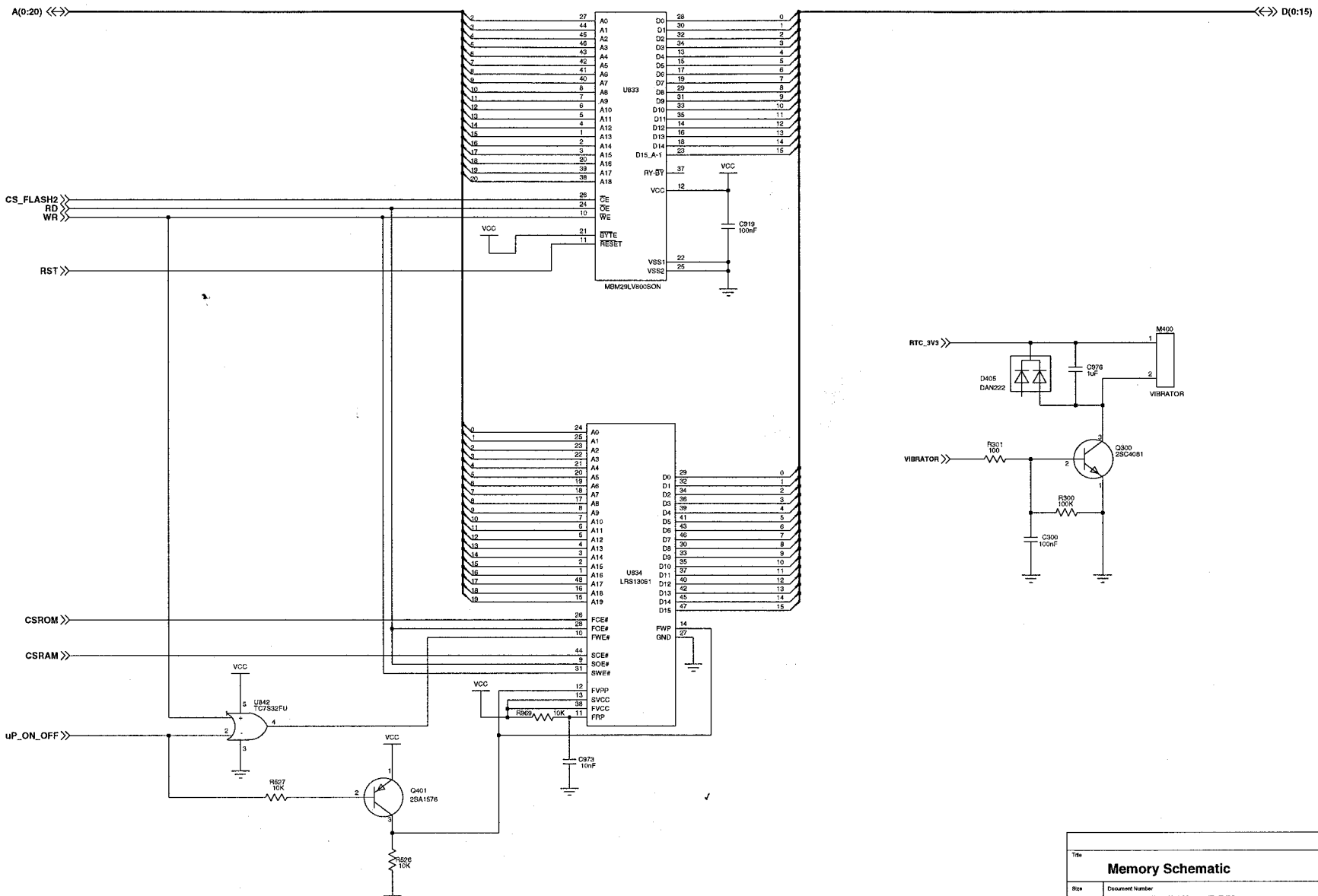
Size	Document Number	Rev
A3	SAMSUNG/SGH-600/B.B/Logic	MVT-1
Date: Wednesday, June, 24, 1998	Sheet 4 of 18	



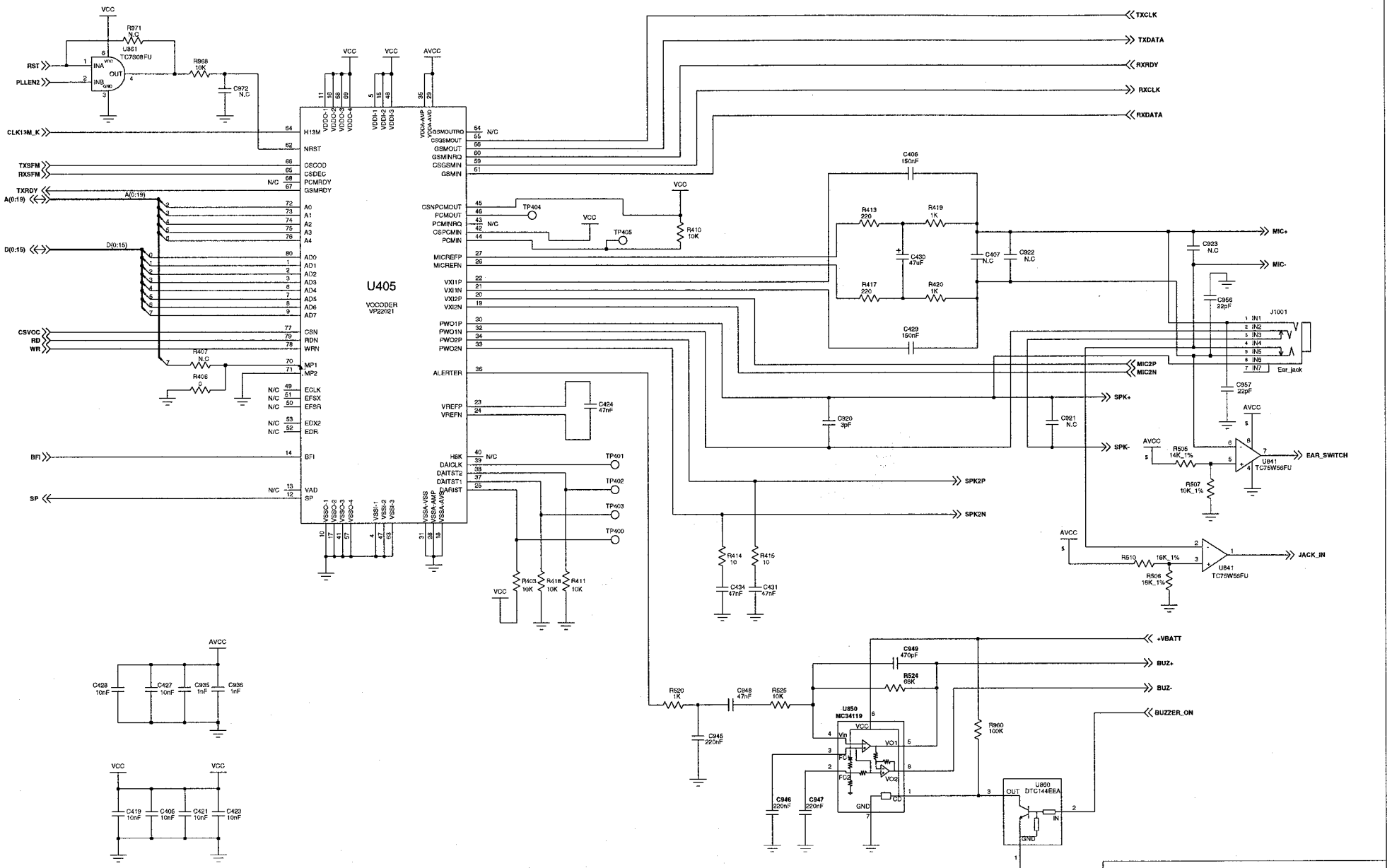
Title: LCD Schematic		
Size: A3	Document Number: SAMSUNG/SGH-600/B.B/LCD	Rev: MVT-1
Date: Wednesday, June, 24, 1998	Sheet 5 of 18	



Title: **Charger Schematic**		
Size: A3	Document Number: **SAMSUNG/SGH-600/B.B/CHARGER**	Rev: MVT-1
Date: **Wednesday, June, 24, 1998**	Sheet **6 of 18**	

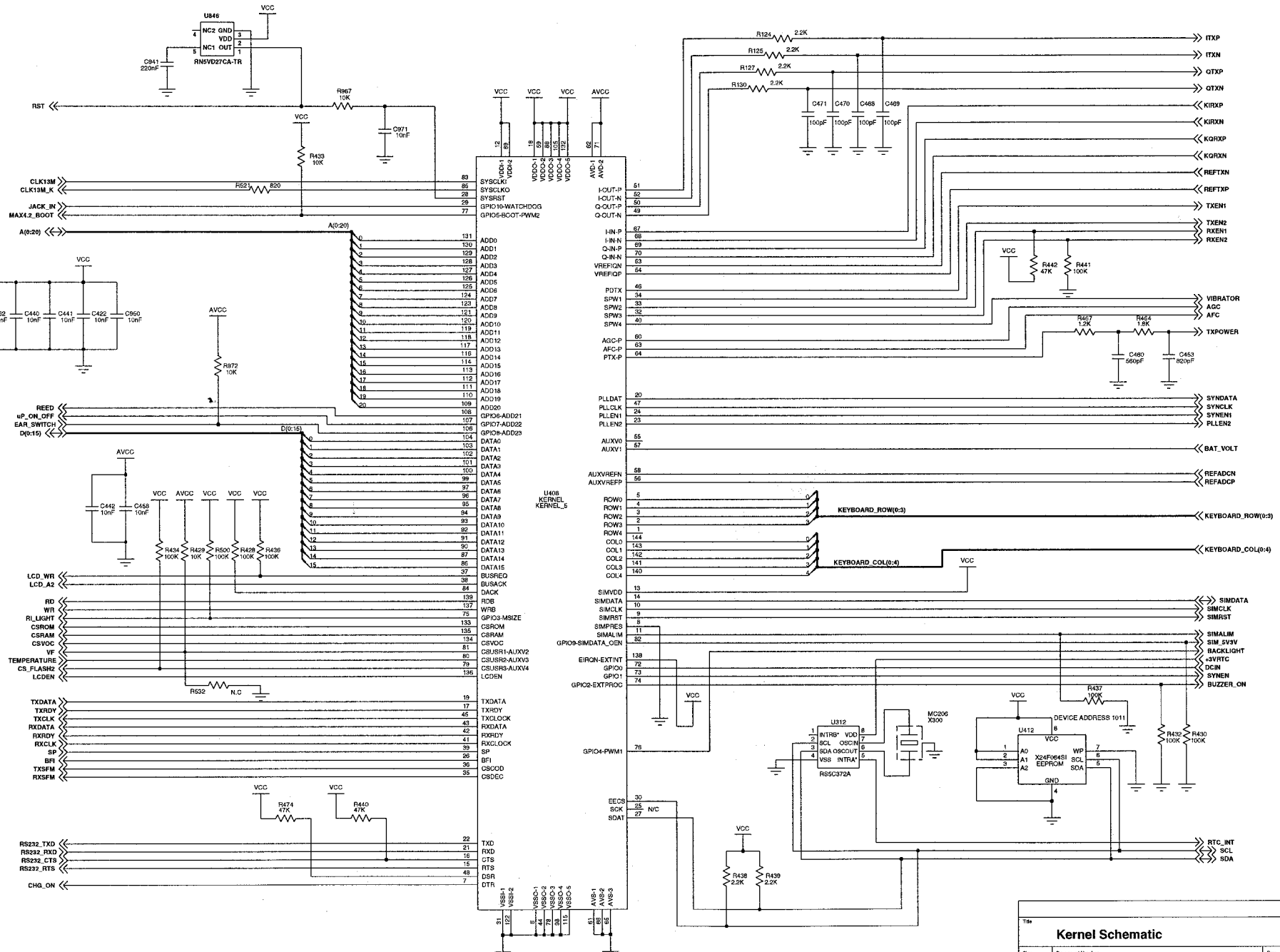


Title	**Memory Schematic**	
Size: A3	Document Number: **SAMSUNG/SGH-600/B.B/Memory**	Rev: MVT-1
Date: **Wednesday, June, 24, 1998**	Sheet **7 of 18**	

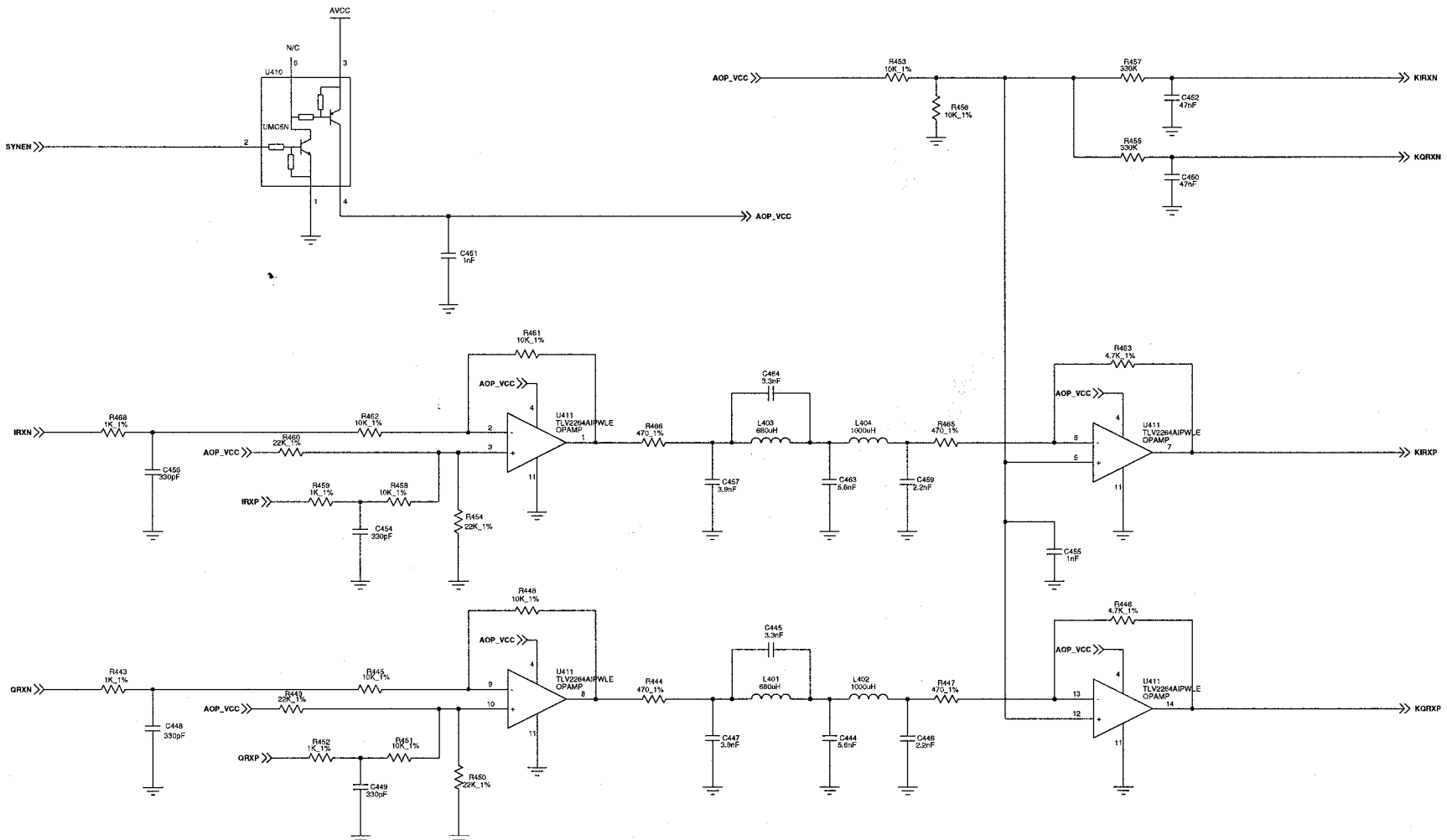


Vocoder Schematic

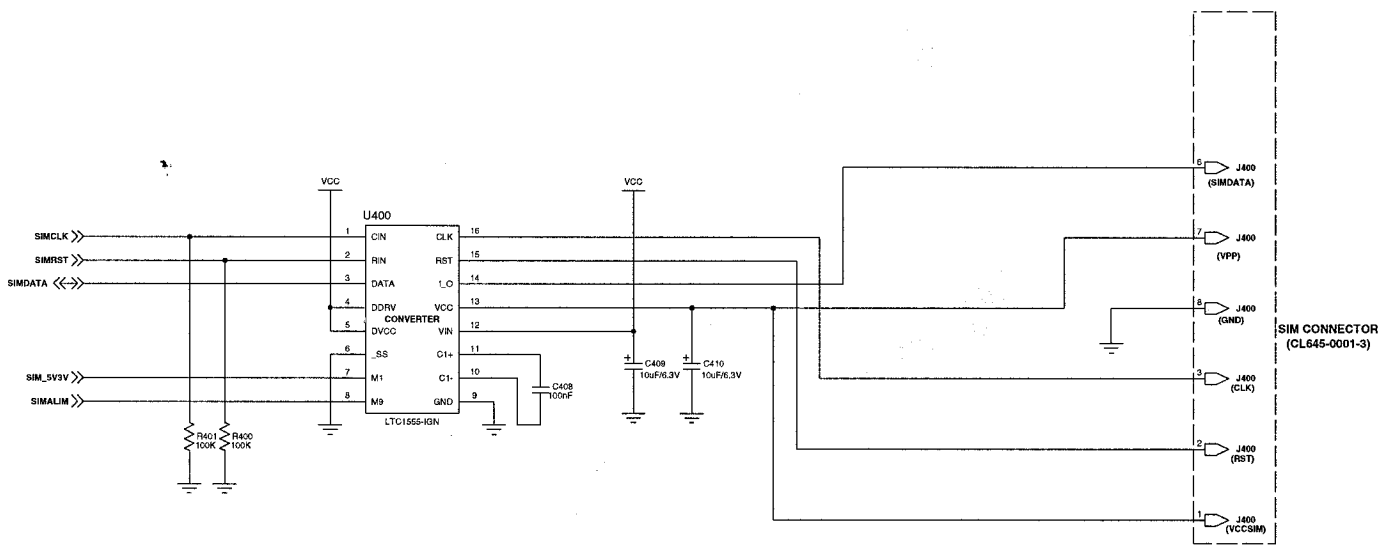
Size: A3	Document Number: SAMSUNG/SGH-600/B.B/Vocoder	Rev: MVT-1
Date: Wednesday, June, 24, 1998	Sheet 8 of 18	



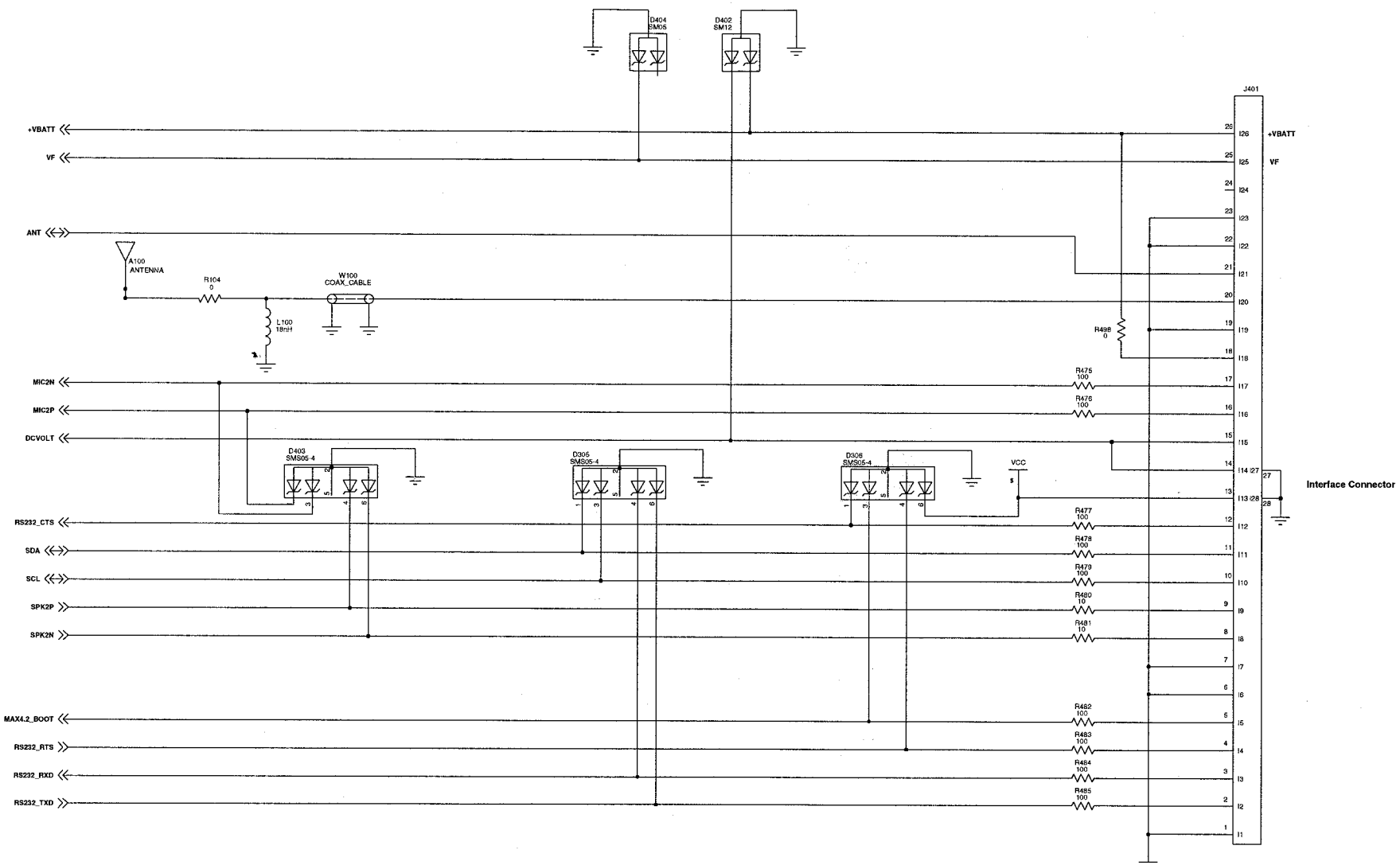
Title	Kernel Schematic		
Size: A3	Document Number: SAMSUNG/SGH-600/B.B/Kernel		Rev: MVT-1
Date: Wednesday, June, 24, 1998		Sheet 9 of 18	



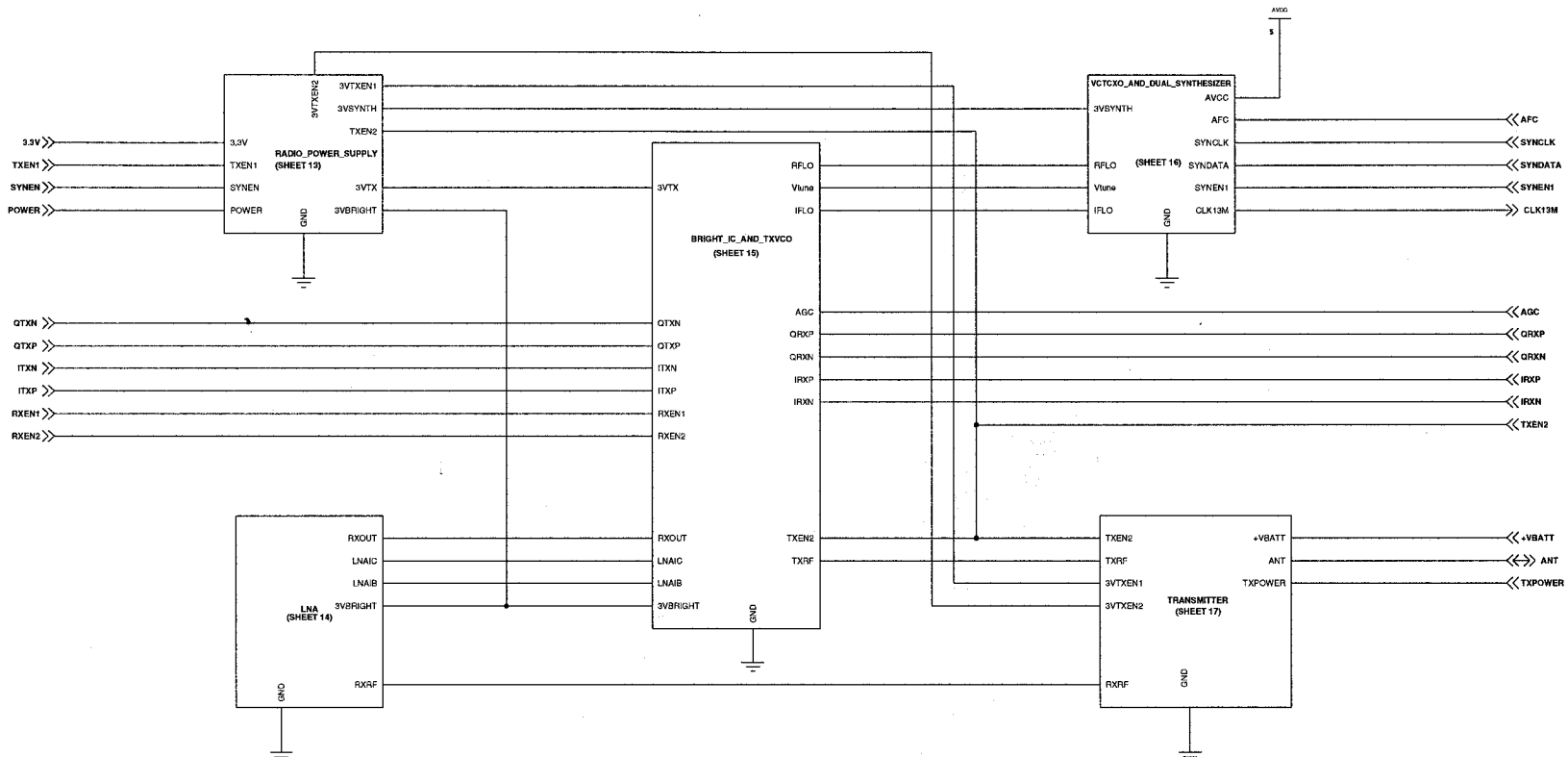
Title: **Baseband Filters Schematic**		
Size: A3	Document Number: SAMSUNG/SGH-600/B.B/Filters	Rev: MVT-1
Date: Wednesday, June, 24, 1998	Sheet 10 of 18	



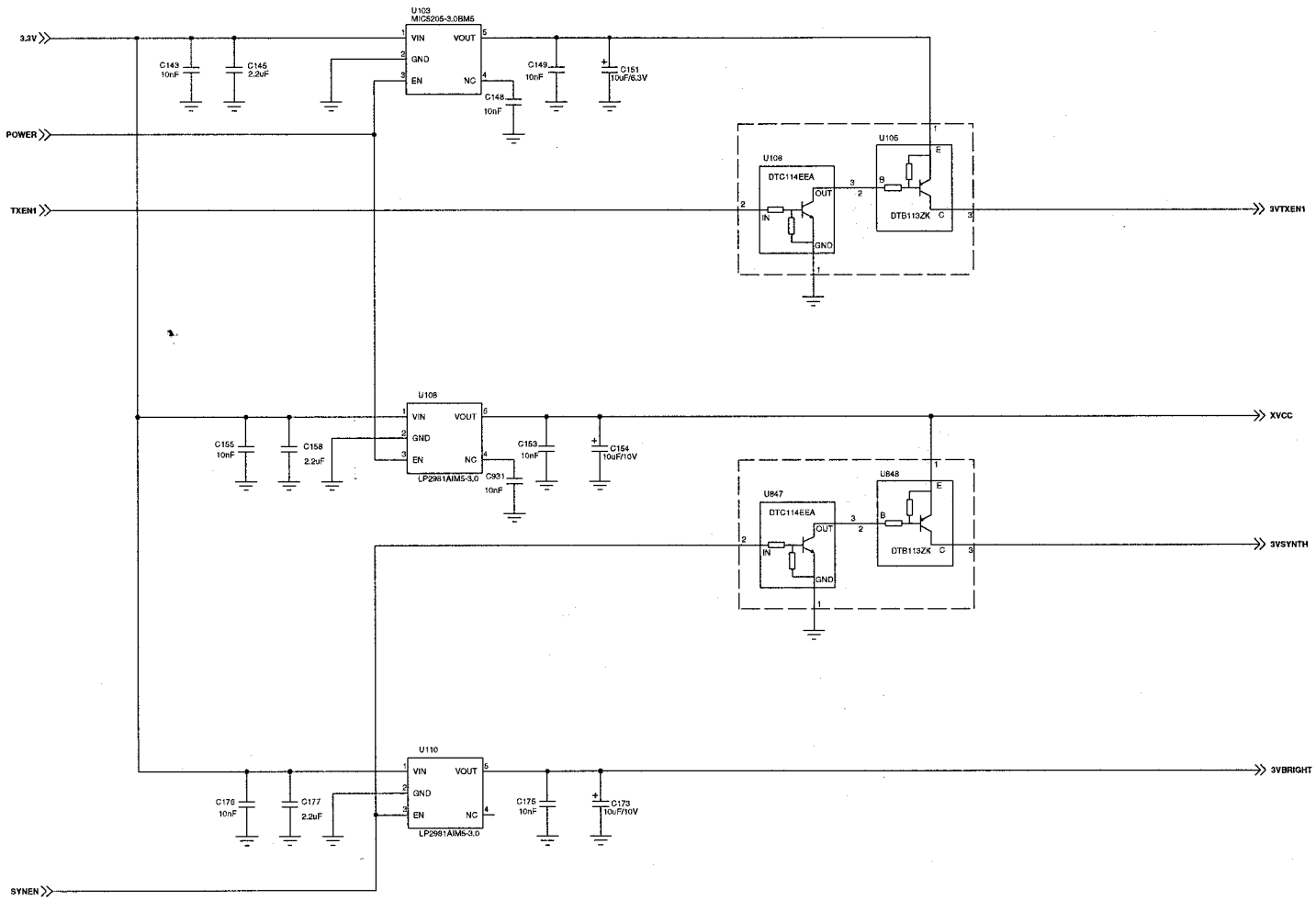
Title: Sim Interface Schematic		
Size: A3	Document Number: SAMSUNG/SGH-600/B.B/SIM Interface	Rev: MVT-1
Date: Wednesday, June, 24, 1998	Sheet: 11 of 18	



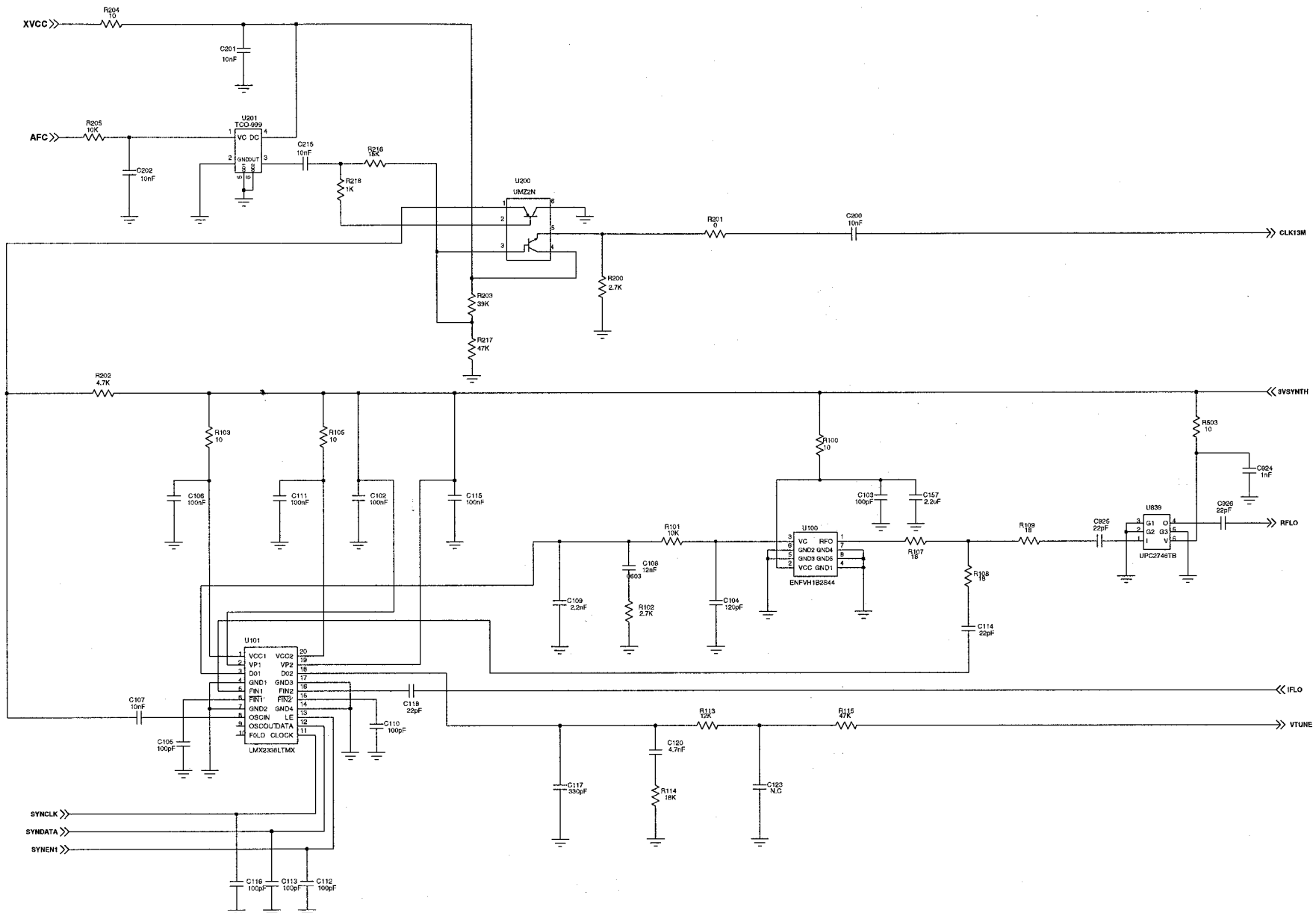
Title: **Interface Connector Schematic**			
Size: A3	Document Number: SAMSUNG/SGH-600/B.B/Interface Connector		Rev: MVT-1
Date: Wednesday, June, 24, 1998		Sheet 12 of 18	



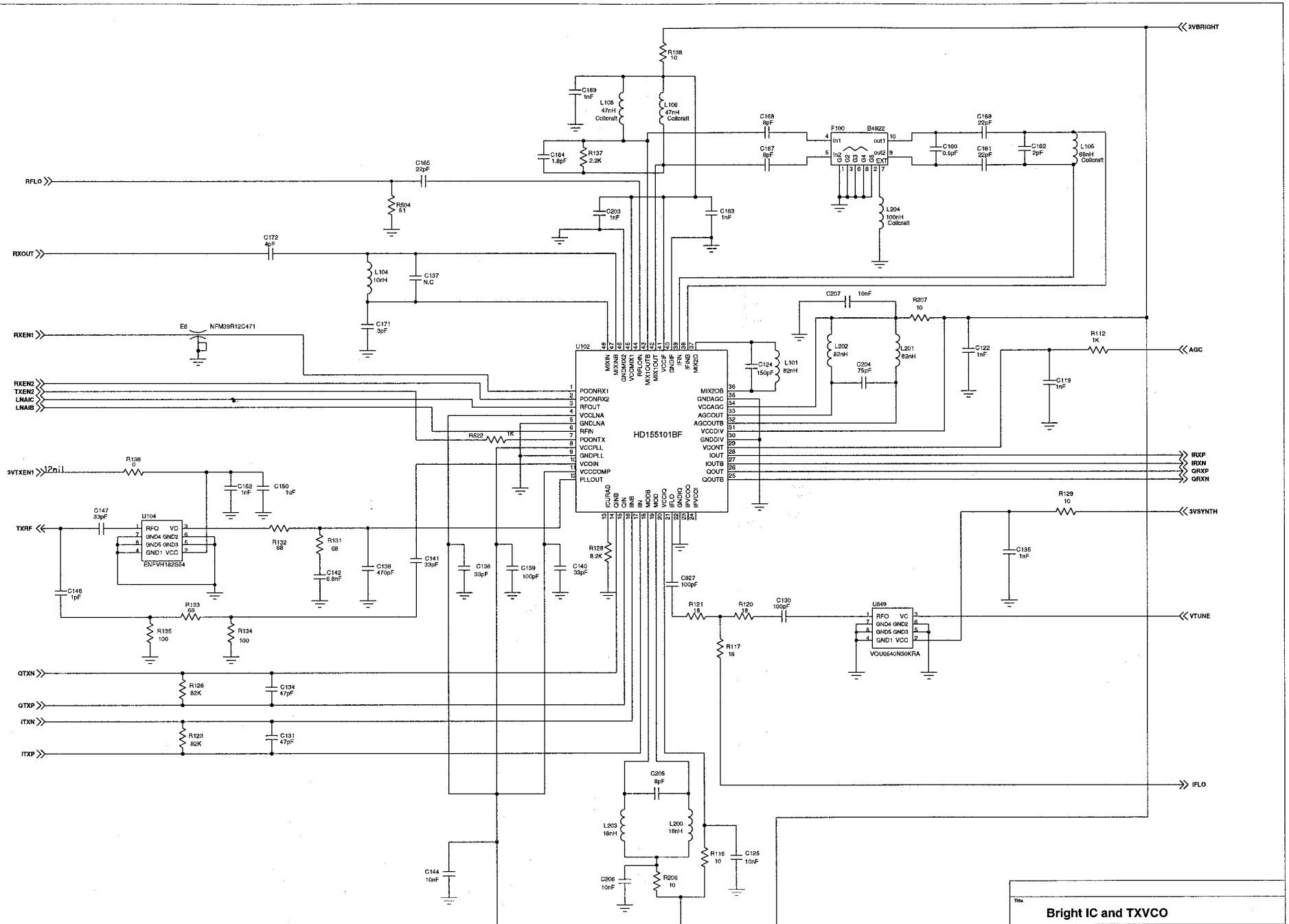
Title: RF TOP BLOCK		
Size: A3	Document Number: SAMSUNG/SGH-600/RF/RF TOP	Rev: MVT-1
Date: Wednesday, June, 24, 1998	Sheet 13 of 18	



Title: **Radio Power Supply**		
Size: A3	Document Number: SAMSUNG/SGH-600/RF/Radio Power Supply	Rev: MVT-1
Date: Wednesday, June, 24, 1998	Sheet 14 of 18	

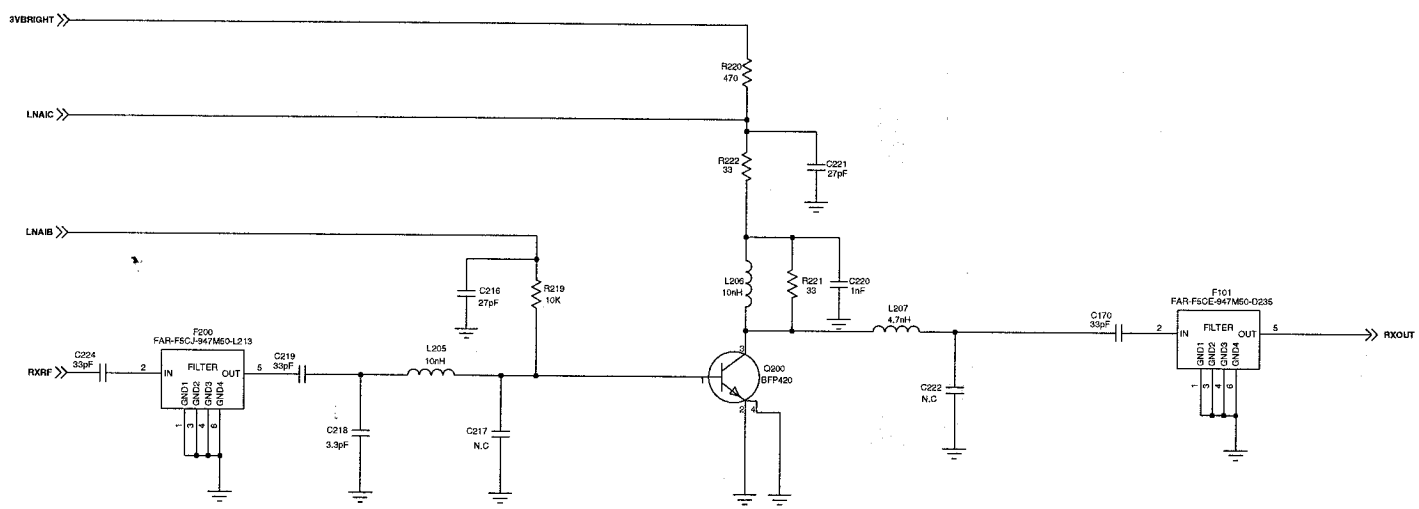


Title: VCTCXO and Dual Synthesizers		
Size: A3	Document Number: SAMSUNG/SGH-600/RF/VCTCXO and Dual synthesizers	Rev: DVT-3.1
Date: Wednesday, June, 24, 1998	Sheet 15 of 18	

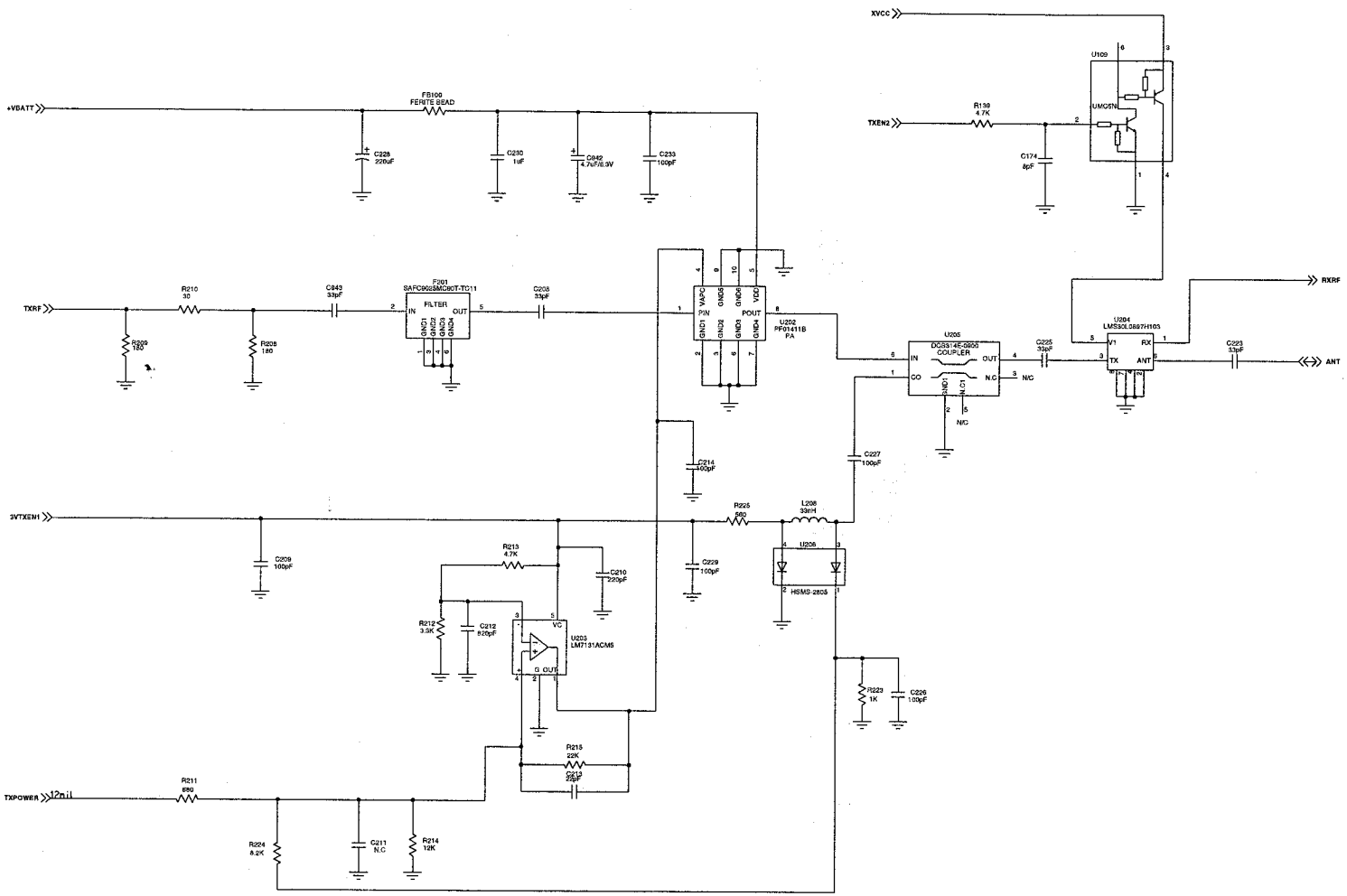


Title: **Bright IC and TXVCO**

Size	Document Number	Rev
A3	SAMSUNG/SGH-600/RF/Bright IC and TXVCO	MVT-1
Date: Wednesday, June, 24, 1998	Sheet 16 of 18	



Title	LNA Schematic	
Size: A3	Document Number: SAMSUNG/SGH-600/RF/LNA Part	Rev: MVT-1
Date: Wednesday, June, 24, 1998	Sheet 17 of 18	



Title	**Transmitter**	
Size: A3	Document Number: SAMSUNG/SGH-600/RF/Transmitter	Rev: MVT-1
Date: Wednesday, June, 24, 1998	Sheet 18 of 18	

1. General Description

1-1 GSM System

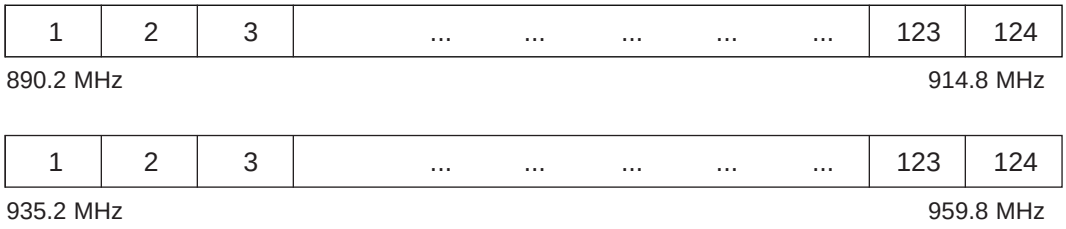
1-1-1 Calls

GSM® is an acronym for Global System for Mobile communications©, using TDMA for wide-area cellular operation. The GSM system consists of the sub-systems shown;
The Mobile Station (MS) talks to the Base Station System (BSS) via an RF air interface. The Base Station System (BSS) consists of Base Transceiver Station (BTS) and a Base Station Controller (BSC). The microwave link between BTS and BSC is called an Abis interface. Generally one BSC controls 20 to 30 BTSs, and a Mobile Switching Center (MSC) controlling the traffic among different cells would be reported back from a number of BSSs. A Visitor Location Register (VLR) will be allocated to one MSC to find the mobiles out of their home cell by listing them to VLR. The MSC would also be connected to the Home Location Register (HLR), the Authentication Center (AC) and the Equipment Identity Register (EIR) So the system verify that the users and equipment are legal subscriber.

1-1-2 Channels

Channels used in the GSM system can be divided into two classes - Logical and Physical channel. Physical channels can be described in terms of their frequency and time domain characteristics. They are the actual frequencies and timeslots the MS and BS transmits or receives on. The logical channels are mapped onto these physical channels logically. Any particular and instant, physical channels may be control or traffic channels, which determines the function of a physical channel at a particular point in time.

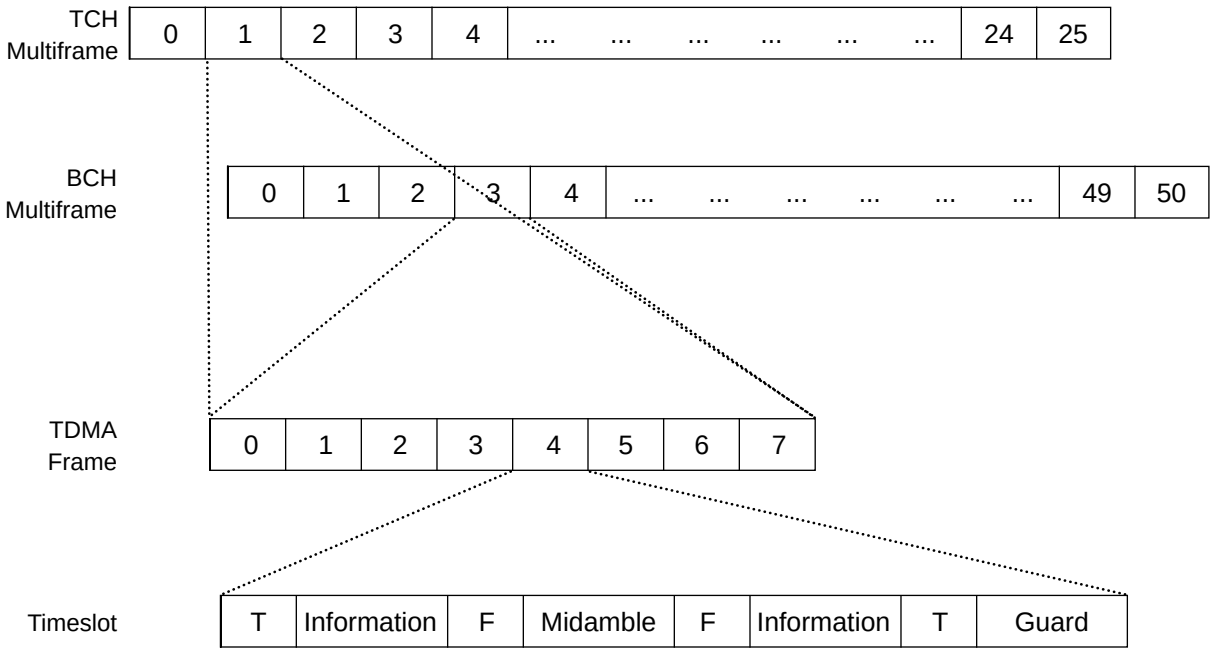
1-1-3 Airinterface of ARFCN (Absolute Radio Frequency Channel Number)



P-GSM: TX: Fl(n) = 890 + 0.2*n (1≤n≤124)
RX: Fu(n) = Fl(n) + 45

< Fig. 1 ARFCN Diagram >

1-1-4 GSM TDMA Timeslots, Frames, and Multiframes



< Fig. 2 Concept of Frames and Timeslots >

1-1-5 Logical Channel

TCH (Traffic CH) is used mainly for transferring the speech information, and the BCH (Broadcast CH) is related to control information.The major function of BCH is transferring information on the downlink for MS synchronization, identification, paging, and controll. BCH is always radiated from every cells and the MS tries to find the BCH which has highest level soon after turned on. The organization of BCH is shown belows; FCCH (Frequency Correction Channel), SCH (Synchronization Channel), and BCCH (Broadcast Control Channel). CCCH (Common Control Channel) will play a role like a message board, and is divided into two control channels - PCH (Paging Channel) and AGCH (Access Grant Channel). SACCH (Slow Associated Control Channel) exists every 12 frames, controlling and controls the TX power level and timing advance of MS, transferring cell information to MS on downlink, transferring the information about RX level, Quality, and RX level of adjacent cell on uplink. FACCH (Fast Associated Control Channel) steals and changes the TCH when needing a Handover. SDCCH (Stand-alone Dedicated Control Channel) and RACH (Random Access Channel) operate during the call setup procedure.

1-2 GSM HHP Feature

1-2-1 Main Set (HHP)

The main set is a microprocessor (KERNEL5)-controlled, full duplex radiotelephone system that provides the user with GSM cellular service through cell sites linked to control centers.
It also provides functions related to frequency control, power control, and many user-convenience feactures.

1-2-2 Desktop Charger

The DTC is designed to charge batteries from commercial mains. The charger has two battery receptacles. The forward one is for rapid charging, and the rear for normal charging.

1-2-3 Travel Adaptor

The travel adaptor is designed to operate the main set by supplying power to directly, while charging batteries from commercial mains.

1-2-4 Cigar Lighter Adaptor

A cigar lighter adaptor is used to operate the main set and charger the battery from a 12 volt vehicular electrical system.

1-2-5 Hands Free Car Kit

The Hands Free kit provides unlimited talk time, as power is supplied by the vehicular electrical system, and improved receiving and transmitting due to the external antenna.
The Hands Free car kit adapts an external speaker, a hands-free microphone, a bracket, and a cradle for mounting the main set. ®Hands Free© means user can have a conversation without holding the phone by hand.

MEMO

3. Specification

3-1 General Specification

3-1-1 Frequency Range

- Transmit (Uplink): 890 ~ 915 MHz
- Receive (Downlink): 935 ~ 960 MHz

3-1-2 Channel Spacing : 200 kHz

3-1-3 Number of Channels: 124

3-1-4 Frequency Spacing: 45 MHz

3-1-5 Modulation Data Rate

- 270.833 kbits/sec

3-1-6 Frame Period: 4.615 msec

3-1-7 Timeslot Period: 576.9 μsec

3-1-8 Modulation Type: 0.3 GMSK

3-1-9 MS Max Power: 2 W (33 dBm)

3-1-10 MS Min Power: 0.3 W (5 dBm)

3-1-11 Voice Coder Bit Rate: 13 kbits/sec

3-1-12 Input / Output Impedance : 50Ω

3-1-13 VCO Frequency

- TX VCO : 890 ~ 915 MHz,
- UHF VCO : 1160 ~ 1185 MHz
- VHF VCO : 540 MHz

3-1-14 IF

- 1st RX IF: 225 MHz
- 2nd RX IF: 45 MHz
- 1st TX IF: 270 MHz

3-1-15 VCTCXO Frequency

- 13 MHz (±5 PPM)

3-1-16 Operating Temperature

- Main : Nominal: +15 ºC ~ +35 ºC
  Extreme: -10 ºC (spec) ~ +55 ºC

- TA : Nominal: +15 ºC ~+35 ºC
  Extreme: -20 ºC ~ +55 ºC

3-1-17 Operating Voltage

- High Voltage: 4.1 V
- Nominal Voltage: 3.7 V
- Low Voltage: 3.4 V

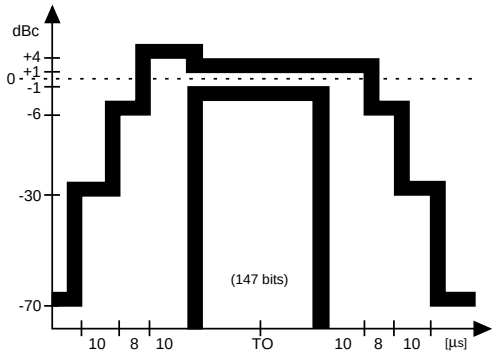
3-2 Transmitter Specification

3-2-1 Power

Power Control Level	Peak Power (dBm)	Norminal (dB)	Extreme (dB)
5	33	±2 dB	±2.5 dB
6	31	±3 dB	±4 dB
7	29	±3 dB	±4 dB
8	27	±3 dB	±4 dB
9	25	±3 dB	±4 dB
10	23	±3 dB	±4 dB
11	21	±3 dB	±4 dB
12	19	±3 dB	±4 dB
13	17	±3 dB	±4 dB
14	15	±3 dB	±4 dB
15	13	±3 dB	±4 dB
16	11	±5 dB	±6 dB
17	9	±5 dB	±6 dB
18	7	±5 dB	±6 dB
19	5	±5 dB	±6 dB

The power-time template requirements for mobile stations also apply to base stations. The only difference is that, in the base station case, no short burst (random access) exists. To measure the template, the base station has to be operated in its *bursting mode*. This test cannot be performed on the base channel, since a base station has to transmit continuously in all time slots. In most cases, an additional channel besides the base channel has to be activated or the transmitter under test is not considered to be configured as a base channel transmitter. The average peak power from the previous part of the test is used as a reference. The time reference is provided by the training sequence in the middle of the burst. The template has to meet the requirements of Fig. 6. Again, the noise level of -70 dBc is dependent on the actual transmitted power level. If this level is below -36 dBm, the absolute level applies. The template is usually evaluated along with the peak power level.

3-2-2 Power Ramping Time Level



< Fig. 6 Power-Time Template >

3-2-3 IF Filter

- 270 MHz LC Filter

3-2-4 TX SAW Filter

- Spurious signal atenuating : ≤-70 dBc
- Wide Bandwidth to make plane Group delay characteristic

3-2-5 Power Amplifier

- Total Efficiency: 40~45 % at Pin=1mW,
  V_{DD}=3.6 V, Pout=3.2 W

3-3 Synthesizer Specification

3-3-1 General Specification

- Frequency Hopping : 1 Channel to < 3° rms in < 500 mS
- Phase Noise: < 3° RMS

3-3-2 IF Synthesiser

- Synthesizer Frequency: 540 MHz
- Output Signal Drive Level: -10 dB
- 2nd IF LO Output Frequency FIR: 45 MHz

3-3-3 FIR Output

- 1st IF: 225 MHz
- 2nd IF: 45 MHz
- FIR Frequency: 45 MHz
- FIR Level: -17 dBm

3-3-4 Phase Noise Specification

Offset (kHz)	Phase Noise (dBc/Hz)
± 200	< -75
± 250	< -78
± 400	< -105
> 600	< -105
> 1200	< -105
> 1800	< -113
> 3000	< -115
> 6000	< -121
> 10.0 MHz	< -124
> 20.0 MHz	< -129
> 30.0 MHz	< -134

3-4 Receiver Specification

3-4-1 Front-end Specification

- Input Frequency range: 935 MHz ~ 960 MHz
- Gain: 18 dB
- If Frequency range: 540 MHz
- Input Impedance: 150 Ω
- Output Load: 1 kΩ
- Overall Sensitivity: -106 dBm for 9 dB S/N in 180 kHz

3-4-2 Sensitivity

- Reference Sensitivity Level: -102 dBm
- Channel Width : 180 kHz
- Input Thermal Noise: -121.4 dBm/Hz
- Ouput S/N: > 9 dB
- Noise Figure: < 7 dB

3-4-3 Intermodulation

- Input Useful Signal: -99 dBm
- Interferer: -49 dBm at ± 800 kHz and 1600 kHz

3-4-4 Selectivity

Signal	Type	Level
Useful Signal	GMSK	- 82 dBm
Cochannel	GMSK	- 9 dBc
± 200 kHz	GMSK	+ 9 dBc
± 400 kHz	GMSK	+ 41 dBc
± 600 kHz	GMSK	+ 49 dBc

MEMO

2. Circuit Description

2-1 RF Part

2-1-1 Frequency Generator

The 13MHz reference clock (VCTCXO) drives the logic and RF part. The 13 MHz reference is controlled by the logic (10bits DAC minimum) and is kept to a frequency error less than ±0.1 ppm after synchronization with the GSM network.
A 540 MHz oscillator is divided by 2 to generate a fixed 270 MHz VHF LO used in the TX I,Q modulator and mixed by 270 MHz. The UHF LO for the first RX down conversion and the TX offset mixing works in superheterodyne mode to reduce the relative bandwidth and to be able to work at a frequency greater than 1 GHz.

2-1-2 Transmitter

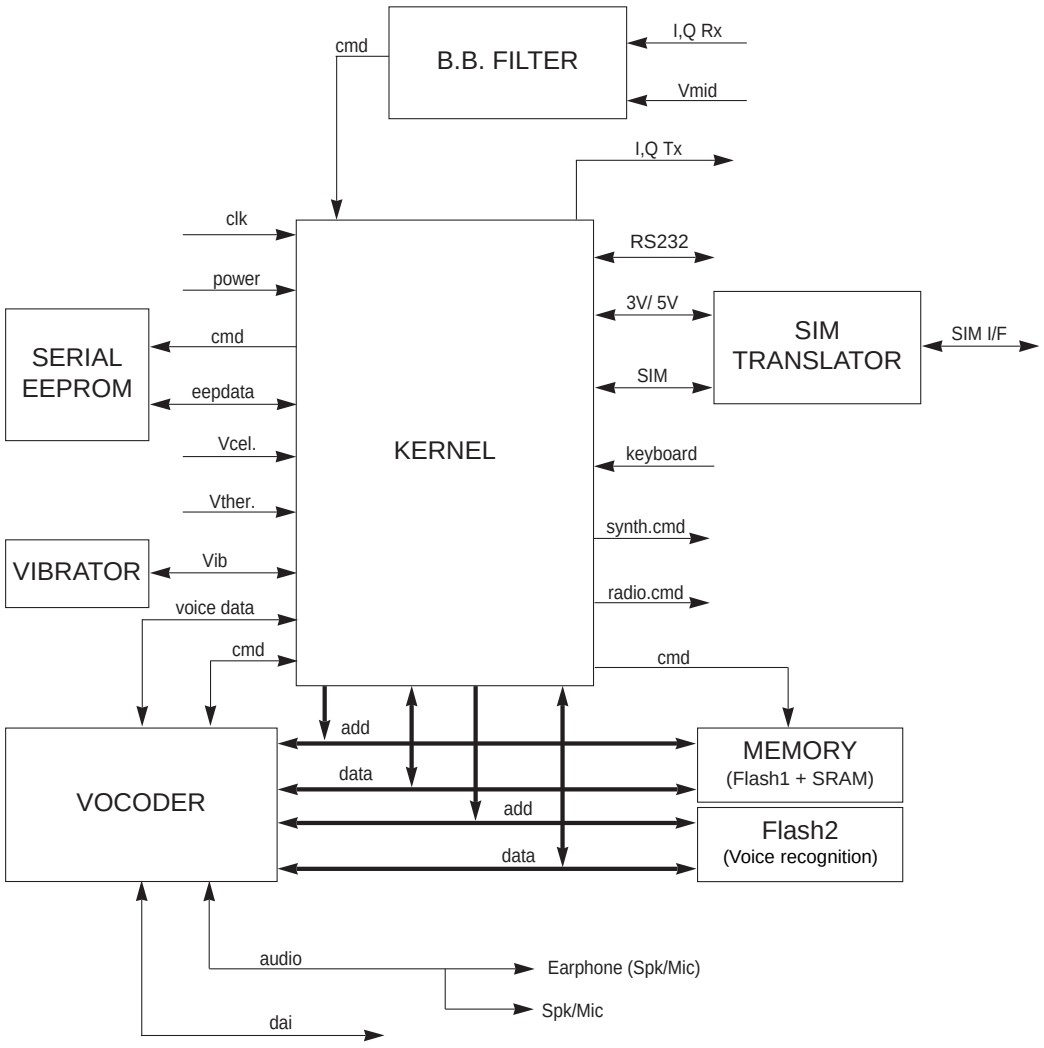
The baseband GSM chipset (Kernel5) generates I and Q baseband signals for the transmit vector modulator. The modulator provides more than 40dBc of carrier and unwanted side-band rejection and produces GMSK modulated signal, the 'reference' signal at 270 MHz which passes to the offset phase-locked loop block (OPLL). The OPLL consists of a down-converter, phase detector, loop filter and transmit VCO operating at the final RF output frequency. The down converter mixes the UHF LO (eg. 1172 MHz) with the transmit VCO signal to generate a 'feedback' signal at 270 MHz. The 'feedback' signal passes via a limiter to one port of the phase detector. The GMSK 'reference' signal from the vector modulator passes via a second limiter to the other input port of the phase detector. The phase detector generates an error current proportional to the phase difference between the 'feedback' signal from the down-converter and the 'reference' signal from the vector modulator. This error current is filtered by a second order low-pass filter to generate an output voltage which depends on the GMSK modulation and the desired channel frequency. This voltage controls the transmit VCO such that the VCO output signal, centered on the correct RF channel, is frequency modulated with the original GMSK data. The centre frequency of the transmit VCO is offset from the UHF LO frequency by 270 MHz. The OPLL acts as a tracking narrowband band pass filter tuned to the desired channel frequency. This reduces the wideband noise floor of the modulation and up-conversion process and provides significant filtering of spurious products. The OPLL architecture results in a low-noise GMSK modulated signal at 902 MHz with very low spurious content.
The RF GMSK output from the transmit VCO is fed via TX SAW filter to the RF power amplifier. The peak output power and the profile of the transmitted burst are controlled by means of a closed feedback loop. The RF output from the PA is sampled with a directional coupler. The sampled signal passes to an RF detector diode whose output voltage is dependent on the incident RF level. This 'feedback' voltage passes to the inverting input of the loop integrator. A 'reference' signal is generated within the baseband section under control of the layer 1 software. The loop maintains zero difference between the 'feedback' signal and the 'reference' signal. In this way, the amplitude and shape of the transmitted RF burst may be controlled by the baseband processor. In particular, the rise and fall profiles can be controlled to meet the stringent power/time templates and switching transient requirements of GSM 05.05.
The RF output passes to the antenna connector via an integrated TX/RX switch and lowpass filter to attenuate the harmonics generated by the power amplifier.

2-1-3 Receiver

The incoming RF signal passes through the integrated lowpass filter and TX/RX switch. This is followed by a 947 MHz SAW Band Pass Filter and a bipolar low-noise amplifier (LNA). The HD155101BF includes an active bias circuit which stabilizes the DC operating point of the LNA. The RF signal passes via a second RF SAW filter to the first receive mixer. This mixer is implemented as a Gilbert cell within the HD155101BF. The incoming signal at 947 MHz mixes with the UHF LO at 1172 MHz to generate a 225 MHz IF signal. The IF signal passes from the mixer output via a 225 MHz IF SAW filter to the first IF amplifier. A further internal Gilbert cell mixes the 225 MHz IF signal down to the 45 MHz second IF. The 45 MHz output from the second mixer is filtered and passes to the AGC amplifier. The gain of the AGC amplifier is set by a DC control voltage supplied by the baseband. The usable control range is in excess of 80dB. Finally, the AGC output signal at 45 MHz passes to the demodulator and is mixed down to DC to generate I and Q baseband signals. The baseband signals pass via baseband filter to the baseband A/D converters. The remainder of the channel filtering is performed by the baseband chipset.

2-2 Baseband Part

2-2-1 General Block Diagram



< Fig. 3 Baseband Block Diagram >

2-2-2 ROM1 & SRAM

8M (X16) Flash ROM and 2M (X8) bit SRAM are used. Two devices are merged in one package. This device is a combination memory organized as 524, 288 x 16 bit flash memory and 262, 144 x 8 bit static RAM in one package.

2-2-3 ROM2

A 8M (X16) bit Flash Memory is used for the voice recognition and voice memory. This device is an 8, 388, 608 bit flash memory with batch chip erasing, sector erasing, and byte and word writing using a single 3V power supply.

2-2-4 EEPROM

The kernel requires some external non-volatile memory to store various system parameters, such as RF control calibrations, extra dial stores etc. A 64 K (65, 536) bit device is used. This device is internally organized 8192 x 8. This device features a serial interface and software protocol allowing, operation on a simple, two wire bus.

2-3 SIM

2-3-1 SIM Interface

An interface is provided to a serial port controlling the SIM interface. It can support 5V and 3V SIM interface. The hardware interface consists of SIMVCC, SIMdata I/O, SIMclk output, SIMRST output, and SIMPRES input. The interface is controlled through TX Data, RX Data, control, and status registers. Transmit and receive data may use a 256 byte buffer or be exchanged through single byte registers. SIMVCC may be used to control the power supply to the SIM card.

2-4 POWER MANAGEMENT

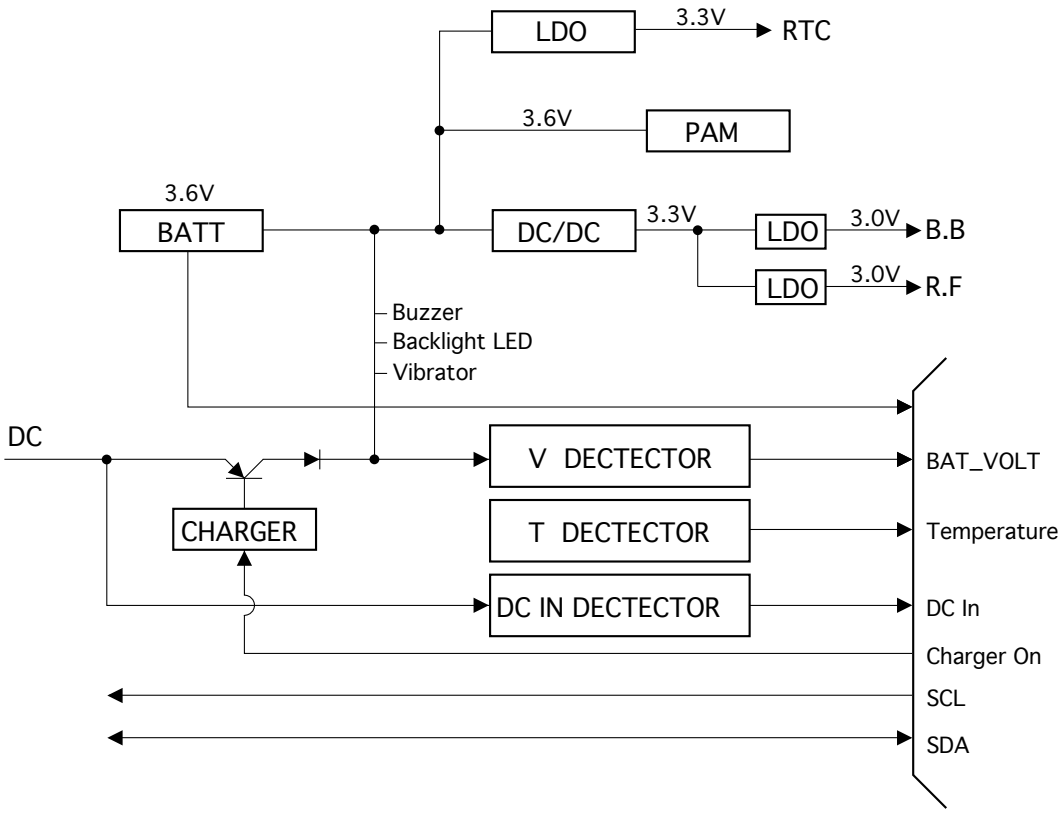
2-4-1 DC/DC Converter

Our 1 cell Li-ion battery solution requires a up-converting DC/DC conversion circuit for efficiency improvement. The device is a PWM Step-up DC/DC converter IC. Specification is as below;

- Vin: 2.75 V ~ 4.2 V
- Vout: 3.3 V ~ 4.1 V
- Ripple: less than 50 mVpp
- Efficiency: typ. 85 % (up to 96%)

2-4-2 Charger Circuitry

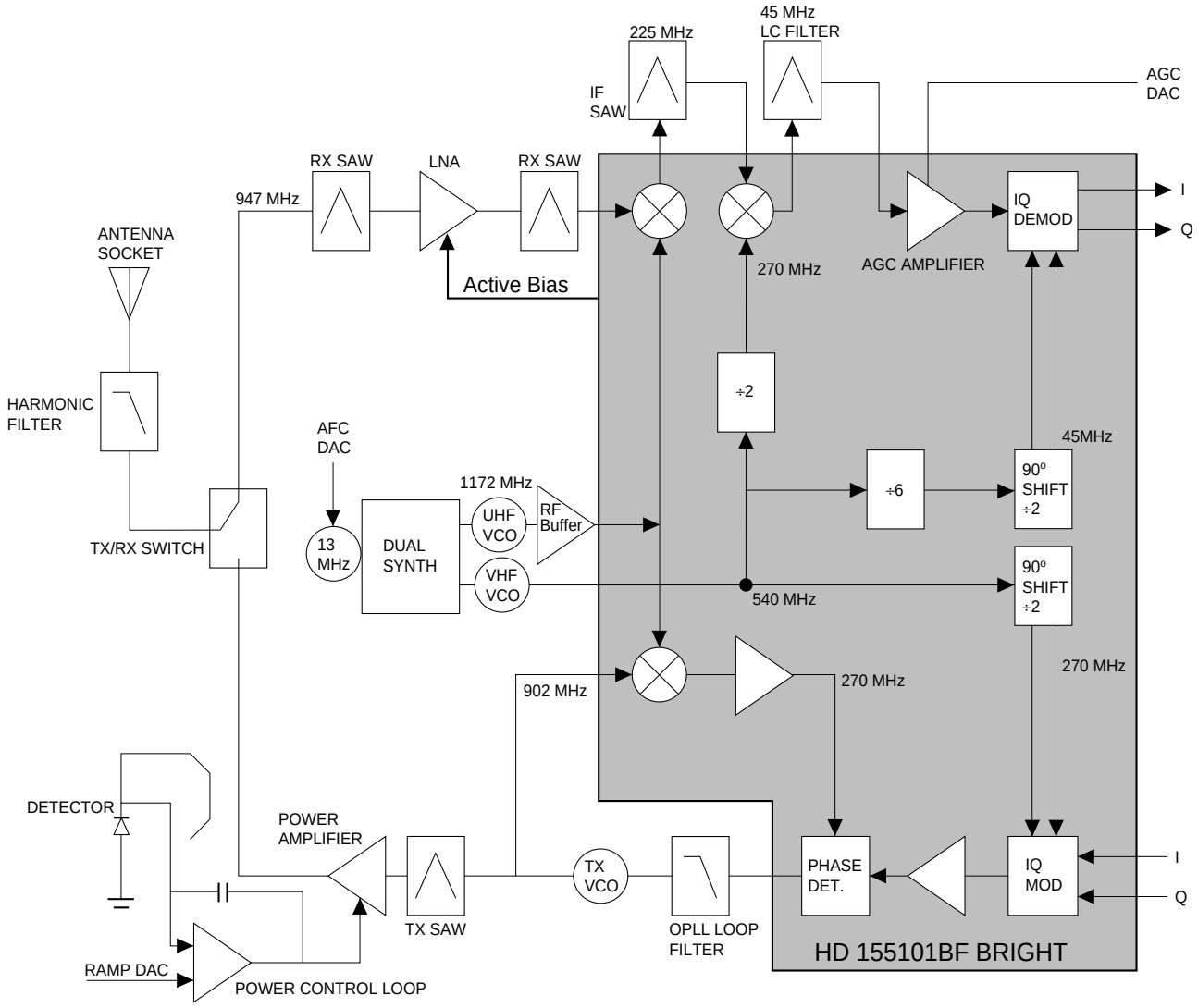
The simplified built-in charger circuit diagram is as below ;



< Fig. 4 Built-in Charger Circuitry >

2-5 RADIO INTERFACE

2-5-1 RF Block Diagram



< Fig. 5 RF Block Diagram >

2-5-2 Baseband Filter

To control the spectral splatter and thus the intersymbol interference (ISI), filtering is applied to the baseband pulses. The required filtering achieved very simply using a small, low cost discrete LC structure, which has the great advantage of not consuming current.

2-6 AUDIO

2-6-1 Audio Inputs

The Handset provides two audio inputs:
• Built in microphone
• Connection for external microphone

A microphone biasing amplifier reduces component count in the overall system design:
• Supply: 2.2 V regulated to ±20 %
• Different output to eliminate possible coupling noise problems, MICBIASP and MICBIASN
• Maximum current: 500 uA
• Maximum load: 200 pF

2-7 EXTERNAL INTERFACE

A 18 pin connector is mounted on the bottom corner of the PCB. The antenna external connection is on the right hand side of this connector.

2-8 KERNEL SPECIFICATION

2-8-1 FEATURES

• Complete Layer 1 support
• TDMA burst building (ETSI Rec.5-02)
• Coding and interleaving (Rec. 5-03)
• GMSK with differential coding (Rec. 5-04)
• Programmable power template for Tx burst control
• AGC in Receive mode
• I,Q inputs or single intermediate frequency (IF) input
• Detection of FCCH, SCH, Normal and Dummy Bursts
• Flash ROM programming abilities
• Auxiliary ADC for battery voltage and temperature monitoring

2-8-2 Equalizer

MAJOR FEATURES

- Frequency Correction Burst Correction
- Frequency Correction Burst Frequency Measurement
- Synchronization Burst Long Preamble Correlation
- Normal Burst Short Preamble Correlation
- Channel Impulse Response Generation
- Possible Received Value Generation
- Data Equalization
- Carrier Power Measurement
- Doppler Shift Measurement and Correction
- Scaled 7-Bit Soft Decision
- I and Q component recovered from Received Data

2-9 VOCODER SPECIFICATION

2-9-1 FEATURE

- Complete GSM voice encoding and decoding functions
- DTX function
- Voice Activity Detection (VAD) output
- Fully asynchronous coding and decoding
- A-law PCM conversion
- DTMF generation
- Sidetone level control
- Programmable microphone amplifier with two differential input ports
- Two programmable audio output amplifiers
- 13 MHz master clock

2-10 Desk Top Charger

2-10-1 Charging

The desk-top charger contains switching regulator to charge a lithium battery from an DC/DC adaptor. The battery type is detected at pin 15 (MPU) through U5 (front port) and U26 (rear port). Battery charging current is turned into Vi. Vi is measured at pin 12 (MPU) after R32 and C23 to cancel the noise. When the battery voltage is too low, the charging circuit turns to trickle mode using Q9 and Q11.

2-10-2 Control Part

This circuit contains 4-bit micro controller (U21), including an I/O port, timer, A/D converter to control battery charging. This circuit uses a 4 MHz main clock and +5V power.

BATTERY VOLTAGE DETECTION

Battery voltage from the front port is detected at R20, R18 and measured at pin 13 (MPU).
Battery voltage from the rear port is detected at R14, R13 and measured at pin 14 (MPU).

BATTERY TEMPERATURE DETECTION

The charger always detects the battery temperature via NTC thermistor to prevent battery thermal problems. This circuit is composed of parallel resistors because NTC thermistor has log-scale thermal characteristics. If the battery temperature exceeds 55 degrees C, charging stops.

AUTONOMOUS TIMER

If MPU has stopped charging and the timer goes to the ‘on’ state by an external shock, overcharging may occur. A timer (U7-4) prevents the battery from being overcharged by any unexpected external influence.

2-11 Cigar Lighter Adaptor (CLA)

2-11-1 General Description

The CLA is a regulated switched-mode power supply designed for use with a portable HHP. The power supply is connected directly to the phone and provides a voltage path for charging a battery installed in the hand-held portable phone.

2-11-2 Circuit Description

The input voltage range of CLA is from 12 Vdc to 30 Vdc, and the nominal voltage is 13.7 Vdc. The output current is 600 mA. The ripple and noise amplitude is less than 50 mV at the input (12 V ~ 30 Vdc). And the limit settings are shown below;

- Current limit : 600 mA ± 50 mA at nominal input 13.7 V
- Output voltage : 9.0 V (+/- 0.8 V) Vdc at no load.

In addition, the temperature limit is -20 upto +85 ºC for storage, and 0 to +40 ºC for operating. The CLA size of SGH-600 is 89.3 x 43 x 27 mm, and the weight is 110 g.

2-12 Travel Adaptor (TA)

2-12-1 General Description

This adaptor is designed for use with a portable hand held phone (HHP). It is a switching-mode power supply connected directly to the phone with a cable, and it provides a voltage for charging a battery installed in the hand held portable phone.

2-12-2 Circuit Description

The input voltage range is 85 ~ 264 Vac, and input frequency is 47 ~ 63 Hz. At an input voltage of 230 Vac (standard input voltage), AC input current is 0.1 A(rms). The output voltage range is 9.0 V ± 10% and the unit maintains current 600 mA ± 30 mA. The operating temperature is 0 ~ 55 ºC, and for storage -20 ~ 85ºC. Power ON/OFF cycle is 1.0sec min. The overall size is 74.1 x 28.4 x 79.8 mm and the weight is 65 g without the output DC cable. The charger is an AC/DC switch mode flyback converter featuring constant current and voltage limit. Output cable is two-way DC cable. Maximum output power is 6.4 W.

2-13 Hands Free Car kit

2-13-1 General Description

Many states and countries are considering legislation requiring mobile phone users to operate in Hands-Free mode while driving.

Feature of the hands free kit are:
- Power adaptor (600 mA) from vehicle battery to GSM battery pack.
- Ignition sensor for automatic power ON/OFF.
- Car stereo mute function in Hands-Free mode, with programmable output level.
- External microphone input.
- Loudspeaker output.
- Hands-Free operation.

2-13-2 Circuit Description

The input voltage range is from 12V dc to 28V dc, (battery) and input current is 10mA(stanby). The operating temperature is -10 ~ 60 °C, and for storage temperature is - 30 ~ 85 °C(± 5 °C). The charging voltage is DC9V and charging current is MAX 600mA.

2-13-3 Audio Features

- Microphone Sensitivity: -60 dB ± 3 dB
- Speaker S/N: -45 dB ± 3 dB (1W Output)
- Speaker Distortion: 20% below (3W Output)
- Speaker Feature: Impedance 4Ω, Max 5W Output
- Echo Cancellation: 50 dB (Min)
- Noise Suppression: 15 dB (Min)